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THE END OF EXCESS (PART ONE): REVERSING OUR ADDICTION TO DEBT AND LEVERAGE

HEARING

BEFORE THE
SUBCOMMITTEE ON
OVERSIGHT AND INVESTIGATIONS
OF THE
COMMITTEE ON FINANCIAL SERVICES
U.S. HOUSE OF REPRESENTATIVES
ONE HUNDRED ELEVENTH CONGRESS
SECOND SESSION

MAY 6, 2010

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THE END OF EXCESS (PART ONE): REVERSING OUR ADDICTION TO DEBT AND LEVERAGE

Thursday, May 6, 2010

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON OVERSIGHT
AND INVESTIGATIONS,
COMMITTEE ON FINANCIAL SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 2128, Rayburn House Office Building, Hon. Dennis Moore [chairman of the subcommittee] presiding.

Members present: Representatives Moore of Kansas, Lynch, Klein, Speier, Driehaus; Biggert and Lee.

Also present: Representative Royce.

Chairman MOORE OF KANSAS. This hearing of the Subcommittee on Oversight and Investigations of the House Financial Services Committee will come to order.

Our hearing this morning is entitled, "The End of Excess (Part One): Reversing Our Addiction to Debt and Leverage," inspired by the April 6, 2009, Time cover story, right here, "The End of Excess: Why This Crisis is Good for America," written by Curt Anderson.

This will be the first in a series of hearing where we will look at the key issues exposed by the financial crisis, and the next steps to continue improving financial stability in an economic recovery.

We'll begin this hearing with members' opening statements, up to 10 minutes per side, and then we'll hear testimony from our witnesses.

For each witness panel, members will have up to 5 minutes to question our witnesses.

The Chair advises our witnesses to please keep your opening statements to 5 minutes to keep things moving so we can get to members' questions.

Also, any unanswered question can always be followed up in writing for the record.

Without objection, all members' opening statements will be made a part of the record.

I now recognize myself for up to 5 minutes for an opening statement.

The strength of our financial system and economy depends on the responsible use of credit and debt built on trust between the lender and borrower that payment will be made in the future.

The word “credit” is derived from the Latin word “credo,” which simply means “I believe.” While the financial industry complains about a lack of certainty as Congress debates financial regulatory reform, there’s a more fundamental lack of trust that the American people now have in our financial system.

To correct these two problems, this lack of certainty and understandable lack of trust, we must enact strong rules of the road this year, so the credibility of our financial system can be restored.

A new law, unfortunately, can’t heal our broken financial system. The financial industry must take their own steps to restore faith in their business. They must provide services their customers really want, and not use hidden fees or balance sheet tricks to cheat their way to the top again.

We need to empower consumers and investors to make better financial decisions. Government must do its part in setting a good example, providing efficient financial oversight with limited resources, and getting on a path to balance the Federal budget so we’re not passing a massive debt on to our children and grandchildren.

In 1978, our combined outstanding debt across the economy, including financial firms, other businesses, households, and local, State, and Federal Government was $3.6 trillion, or 157 percent of GDP. By the end of last year, that number ballooned to $50.3 trillion, or 353 percent of GDP. This is the highest level of combined debt of the United States on record.

Since 1978, our economy is over 6 times larger than what it was, and we have grown, on average, $404 billion each year; but over the same timeframe, our combined debt has grown nearly 4 times as fast, adding nearly $1.6 trillion each year on average.

Even more troubling is the rapid growth of financial sector debt, as it grew over 41 times larger than what it was in 1978. As GAO noted in its leverage study that we’ll hear about today, Wall Street investment banks had leverage ratios of over 30 to 1, compared to the largest commercial banks, which averaged leverage of 13 to 1.

In good times, this means their profits were supercharged, but when asset prices fall, excessive leverage accelerates a firm’s failure, as we saw with Bear Stearns and Lehman Brothers.

Are we addicted to debt and leverage? I’m afraid we might be, and unless we take bold new steps on both financial regulatory reform and budget reform soon, it will be very difficult to reverse this troubling trend.

When I came to Congress in 1999—it was the last 2 years of the Clinton Administration—we had budget surpluses those 2 years, and the first government surpluses in decades. When President Clinton left office, the national debt stood at $5.73 trillion.

Unfortunately, over the next 8 years, our national debt grew at a record pace, nearly doubling, and hitting $10.7 trillion. Our economy was on the verge of going off the cliff, as we were still reeling from TARP and the financial panic in late 2008, and our economy was losing 750,000 jobs a month in early 2009.

Experts and economists from the left and the right, including John McCain’s economic advisor Mark Sandy, implored Congress to act with a large stimulus to stabilize the economy, so even though it wasn’t popular, the government responded by enacting the Recovery Act, and TARP was used to implement the financial stability plan.

What happened next? The economy stabilized, and slowly but surely, we are back on track with real economic growth.

A Republican witness, Professor David Walker, agrees in his testimony, writing, “Our economy would be rebounding much more slowly than it has, if we had not implemented the TARP program.”

Congress has made strong budget reforms, passing the largest deficit-reducing legislation since 1993, in the new health care law. We have re-implemented statutory pay-go, and the President established a Fiscal Responsibility Commission with a report due at year’s end.

I look forward to hearing from our witnesses on these issues today, bringing their experience and expertise on these matters, so we can better understand how debt and leverage impacts every single American, and what are the steps we can take to get us back to a more stable path of economic growth.

Chairman MOORE OF KANSAS. I now recognize for 5 minutes the ranking member of our subcommittee, my colleague and friend from Illinois, Ranking Member Judy Biggert.

Mrs. BIGGERT. Thank you, Chairman Moore, and thank you for convening this important hearing.

Today’s hearing is entitled, “The End of Excess (Part One): Reversing Our Addiction to Debt and Leverage.” However, I would like to add to that. I would add that Washington must reverse its addiction to Big Brother government, wasteful Washington spending, and permanent taxpayer-backed government bailouts.

The denial in Washington must end. Washington must get on the side of the American taxpayer, American families, community-based financial institutions, and American small businesses—the job creators in our economy.

Our Nation’s debt is on an unsustainable track. The denial of some lawmakers that Washington take over with bailouts and spending that is out of control must end.

The front page of today’s Washington Post reads, “Greece’s debt-paying sparks violence.” And as we have all seen in the paper, this European debt crisis will seem like a drop in the bucket when compared to our Nation’s projected debt, which, by some estimates, will reach $15 trillion by the end of 2020, representing 67 percent of GDP.

Levels of debt that are of this nature are not sustainable and represent a barrier to the future economic prosperity of our Nation.

High taxes, inflation, and higher unemployment rates will be the byproducts of the current Administration’s fiscal irresponsibility.

Linked to this irresponsibility is the Administration’s unlimited guarantee of the debt of Fannie Mae and Freddie Mac, with trillions in obligations that are guaranteed by our government, our taxpayers.

Freddie Mac announced yesterday that it will need an additional $10.6 billion in government funding. That’s $10.6 billion more of taxpayers’ money. The latest addition brings the GSE loss to taxpayers to $136 billion.

And with that, Mr. Chairman, I would like to ask unanimous consent to insert in the record three newspaper articles: one from

Bloomberg, saying, “Freddie Mac seeks $10.6 billion from Treasury following first-quarter loss”; one from the New York Times, “Freddie Mac seeks billions more after big loss”; and the third from Politico, “Frank to White House: Fight the GOP.”

Chairman MOORE OF KANSAS. Without objection, they will be made a part of the record.

Mrs. BIGGERT. Thank you.

The Administration has yet to even appoint an inspector general to provide objective, independent oversight over the Federal bureaucrats who now control the GSEs, and I know you have had that bill to do that.

It is inconceivable that officials managing these liabilities would be allowed to do so without proper transparency, independent oversight, and thorough reporting to Congress and the American people, and it’s unacceptable that the Administration continues to kick the can down the road and still has no firm exit strategy to spare taxpayers from future losses associated with Fannie and Freddie. Republicans are ready to address this problem and get taxpayers out of this mess.

Finally, the risk-takers on Wall Street need to know clear rules of the road. The rules must say that there will be no more bailouts and no more institutions “too-big-to-fail.” This message should be clear. If you run your company into the ground, you’ll be shut down. Your creditors and counterparts won’t get a bailout that’s paid for by taxpayers, consumers, or community banks and small businesses that have had no role in your risky behavior.

I look forward to the testimony of today’s witnesses. I’m particularly interested in the findings of the GAO study from last July, that clearly pointed to the fact that because institutions thought that housing asset value, primarily housing prices, would continue to rise, institutional leverage increased.

When these institutions began to experience significant losses due to decline in value of mortgage-related and other assets, financial institutions attempted to deleverage and reduce their risk by raising new equity, reducing dividend payouts, selling assets, and reducing lending.

Raising capital, however, became increasingly difficult after the onset of the crisis, as would-be investors began to have doubts about the quality of these firms’ assets, and financial institutions began to deleverage by selling assets.

In the fourth quarter of 2008, broker-dealers reduced assets by nearly $785 billion, and banks reduced bank credit by nearly $84 billion.

This series of events significantly contributed to our economic crisis. Today, our economy is essentially on thin ice and susceptible to even the most moderate economic shocks, according to GAO.

For this reason, in the reform proposal, H.R. 3310, House Republicans proposed a market stability and capital adequacy board to monitor these interactions.

Congress doesn’t need to bestow more power on the same Washington bureaucrats who didn’t do their job at policing the financial industry or protecting consumers in the first place. Regulators need to get their act together. We must enact smart financial reforms that require coordinated regulatory efforts and bailouts, and bring certainty to the marketplace so that investors invest, businesses expand, and more jobs are created to put Americans back to work.

Finally, until our Federal house is in order, our children and grandchildren will be the ones who will bear the burdens associated with our Nation's addiction to excessive borrowing and spending.

And with that, I yield back.

Chairman MOORE OF KANSAS. I thank the ranking member.

I next recognize Mr. Lynch from Massachusetts for 2 minutes, sir.

Mr. LYNCH. Thank you, Mr. Chairman, for holding this hearing, and I also want to thank our distinguished panelists for their willingness to come before this committee to help us with our work.

Mr. Chairman, our Nation's growing addiction to debt is one that has been largely ignored until the collapse of the financial markets in the fall of 2007. According to the Federal Reserve, at the end of 2009, the combined outstanding debt in the U.S. economy was $50.3 trillion. That includes financial industry debt, non-financial business debt, household debt, and local, State, and Federal Government debt.

Since the boom years began in the 1980's, our debt as a percentage of GDP has risen almost 200 percent, and while a lot of things have happened since the early 1980's, and some of that factor might be mitigated, I think the increase in debt has been instructive, as to where we have been and where we're going.

As we know all too well, no other industry was as highly leveraged and addicted to debt as the financial system. We have learned that Lehman Brothers, and probably other banks, used techniques like the Repo 105 to conceal debt, masking just how highly leveraged they actually were from regulators and investors.

Collateralized debt obligations and other over-the-counter derivatives were multiplying and disguising or transferring debt off the balance sheets of companies into opaque markets, such that regulators and market participants could only guess at the total amounts involved in these deals.

The regulatory reform bill that the House passed last year, the Wall Street Reform and Consumer Protection Act, would establish a stability oversight council to give regulators better tools to monitor and regulate excessive leverage and risk-taking.

I know my colleague, Mr. Miller, has introduced a bill that mirrors a number of amendments that the Senate is currently considering to their regulatory reform bill, limiting the size of megabanks by setting a cap on any company's share of total deposits and setting minimum equity levels for bank holding companies and non-bank financial institutions.

I think these are steps in the right direction, and I'm looking forward to hearing from our witnesses today on further proposals to help wean ourselves from this harmful addiction to debt.

Thank you, Mr. Chairman. I yield back.

Chairman MOORE OF KANSAS. I thank the gentleman.

The Chair next recognizes Ms. Speier from California for 3 minutes.

Ms. SPEIER. Thank you, Mr. Chairman, and thank you to the witnesses for participating in what is a very important hearing. This hearing on the impact of leverage and increasing debt burden is profound. I'm struck by the fact that the two sectors that dramatically increased their debt burden leading up to the current economic crisis were the financial sector and consumers, and we know that it was the financial institutions that fostered the growth in consumer debt through teaser-interest-rate credit cards and loans, no-down auto loans, 2/28, and no-doc pick-a-pay payments, mortgages, and home equity loans, all so that they could be packaged into bonds and CDOs, and synthetic CDOs, that magically received AAA ratings and generated enormous fees and profits.

I strongly believe that excessive leverage used by the large financial institutions was a major factor in the real estate bubble and subsequent financial collapse in 2008. In fact, according to Professor David Moss of Harvard Business School, outstanding debt in the financial sector—and this figure is truly mind-blowing—increased from $568 billion in 1980 to more than $17 trillion in 2008.

Leverage helped firms become "too-big-to-fail." A firm with $1 billion in capital can have $40 billion in liabilities, which means that if it goes down, there are other banks and lenders who need $40 billion in repayments if their balance sheets are going to add up.

The banks that survived the crisis best, like JPMorgan, had the lowest levels of leverage. The leverage ratio at Bear Stearns reached more than 40 to 1 before it failed. By 2007, the leverage ratios of many of the major Wall Street investment banks reached more than 30 to 1, including Lehman Brothers and Merrill Lynch.

But these are only their on-balance-sheet levels. These firms also gamed their leverage numbers by using off-balance-sheet vehicles and tricks, like Repo 105s, to make their balance sheets look better than they really were.

The fact that most of this was short-term debt simply made matters worse, when the real estate bubble burst, and supposedly liquid mortgage-backed securities suddenly became unsellable, causing a downward spiral.

I feel compelled to set the record straight. We are here today not because of overregulation, but because of systemic and systematic de-regulation, with the passage of the Gramm-Leach-Bliley Act of 1999, the Commodities Future Modernization Act in 2000, which prohibits Congress from regulating derivatives, and the SEC's Consolidated Supervised Entities Program in 2004 that led to a relaxation of leverage ratios for investment banks, which then were 12 to 1. They just lifted it altogether.

Regulators still had the power to take many actions in the months and years leading up to the current crisis, but they didn't believe there was a problem. Up until the bitter end, they asserted that there was no bubble and that the market would take care of itself. Well, it didn't.

I'm gratified that the House Wall Street Reform and Consumer Protection Act includes my amendment that would limit debt to equity leverage at systemically risky firms to no more than 15 to 1. The regulators could still impose a lower limit.

I'm delighted that Thomas Hoenig, president of the Federal Reserve Bank of Kansas City, is here. He has said publicly that he believes that there must be a leverage ceiling. In fact, he has said that 15 to 1 is too generous. I might add that Goldman Sachs is presently leveraged at 15 to 1 today, and breaking its own records for profits.

It may be impossible to devise a truly foolproof regulatory regime to prevent the next crisis, but we should not again be totally reliant on the wisdom and good intentions of government regulators, or voluntary restraint by Wall Street firms.

I thank the chairman. I yield back.

Chairman MOORE OF KANSAS. I thank the lady for her statement, and I'm pleased to introduce our first panel of witnesses.

First, we'll hear from Mr. Thomas Hoenig, President and CEO of the Federal Reserve Bank of Kansas City. Welcome, Mr. President.

And next, we'll hear from the Honorable David M. Walker, President and CEO of the Peter G. Peterson Foundation, and former Comptroller General of the United States. Welcome to you, sir.

It's an honor to have such distinguished current and former public officials before our subcommittee today.

Without objection, your written statements will be made a part of the record.

Mr. Hoenig, sir, you're recognized for 5 minutes to provide a brief summary of your statement.

STATEMENT OF THOMAS M. HOENIG, PRESIDENT AND CHIEF EXECUTIVE OFFICER, FEDERAL RESERVE BANK OF KANSAS CITY

Mr. HOENIG. Chairman Moore, Ranking Member Biggert, and members of the committee, I want to thank you for asking me to testify here today, to give me an opportunity to share some of my views on the issues around leverage.

Certainly, among the factors that contributed to this financial crisis, there is no question that leverage was key, and the unwinding of this leverage contributed to the escalation of this crisis into the worst recession in 75 years, hurting Americans at all economic levels.

I have spent more than 36 years at the Federal Reserve, deeply involved in bank supervision, and it has been apparent, to me at least, for some time that our Nation's financial institutions must have firm and easily understood leverage requirements.

Leverage tends to rise when the economy is strong, as investors and lenders forget past mistakes and believe that prosperity will always continue. If we don't institute rules now, to contain leverage, another crisis, I can tell you, is inevitable.

My written testimony addresses the systemic increase, or systematic increase in debt and leverage that has occurred in all major sectors of our economy over the past 2 decades. But my comments today will focus specifically on what occurred at the largest financial firms, which were the catalysts, in many ways, for this crisis.

Leverage, of course, is the ability to use debt to build assets as a multiple of a firm's capital base. The leverage of banking organizations has risen steadily since the mid-1990's. It was not immediately obvious because of the many different ways capital and leverage can be measured.

In my judgment, the most fundamental measure of a financial institution's capital is to exclude intangible assets and preferred shares and focus only on tangible common equity, that is, ownership capital actually available to absorb losses and meet obligations.

Looking at tangible common equity, you see that leverage for the entire banking industry rose from $16 of assets for each $1 of capital in 1993, to $25 for each $1 of capital in 2007.

More striking, perhaps, this aggregate ratio was driven most significantly by the 10 largest banking companies. At these firms, assets rose from 18 times capital to 34, over the same period, and that does not include their off-balance-sheet activities.

These numbers, in my opinion, reflect two essential points. First, that based on capital levels, the 10 largest banking organizations carried fundamentally riskier balance sheets at the start of this crisis than the industry as a whole. Second, their greater leverage reflects a significant funding cost advantage. Not only is debt cheaper than equity, but their debt was cheaper than the smaller organizations, because creditors were confident that these firms were too big to be allowed to fail.

This was a gross distortion of the marketplace, providing these firms an advantage in making profits, enabling them to build size, and then, in the end, leaving others to suffer the pain of their collapse.

This is not capitalism, but exploitation of an unearned advantage; and the list of victims is long, including families who lost homes, workers who lost jobs, and taxpayers who were left to pay the tab.

This increase in leverage in the banking industry spread broadly to other sectors of the economy, creating a general excess of credit growth over the past 10 years, especially, as you said, among consumers.

This economy-wide rise in leverage was based on the assumption that asset prices would continue to rise, especially those in housing this time. When prices fell and defaults and losses mounted, capital ratios that had been systematically reduced over time proved grossly inadequate.

To illustrate, suppose the 10 largest banking organizations had been required to confine their leverage to an historically more reasonable level of $15 of tangible assets for every $1 of tangible common equity, rather than the 34 they had.

Under this historic limit, they would have been forced to hold an additional $326 billion of equity, 125 percent more than they actually had, to absorb potential losses; or, they would have had to cut back on their growth by nearly $5 trillion; or more likely, the combination of those two.

The point is, the institutions got away from the fundamental principles of sound capital management, and those institutions with the highest leverage suffered the most. Financial panic and economic havoc quickly followed.

The process of deleveraging is still under way. Rebuilding capital has begun. But during this rebuilding, loans are harder to get, which is impeding the economic recovery.

With this very painful lesson fresh in our mind, now is the time to act. I strongly support establishing hard leverage rules that are simple, understandable, and enforceable, and that apply equally to all banking organizations that operate within the United States.

As we saw in the years before the crisis, leverage tends to rise during the expansion, as past mistakes are forgotten, and pressure for growth and higher returns on equity mount. Straightforward leverage and underwriting rules require bankers to match increases in assets with increases in capital, and prevent disputes with bank examiners over interpretations of the rules. As a result, excess is constrained and a countercyclical force is created that moderates booms, and forms a cushion when the next recession might occur.

I firmly believe that, had such rules been in place, we would have been spared a good part of the tremendous hardship the American people have gone through during the past 2 years.

Thank you.

[The prepared statement of Mr. Hoenig can be found on page 289 of the appendix.]

Chairman MOORE OF KANSAS. Thank you, Mr. Hoenig.

The Chair next recognizes the Honorable David M. Walker.

Sir, you're recognized for 5 minutes.

STATEMENT OF THE HONORABLE DAVID M. WALKER, PRESIDENT AND CHIEF EXECUTIVE OFFICER, PETER G. PETERSON FOUNDATION, AND FORMER COMPTROLLER GENERAL OF THE UNITED STATES

Mr. DAVID M. WALKER. Chairman Moore, Ranking Member Biggert, and members of the subcommittee, thank you for the opportunity to testify today.

It's very important to state at the outset of this hearing that not all debt and leverage is bad, however, excess debt and leverage is. In addition, individuals, businesses, and countries must not become accustomed to taking on debt in order to finance their ongoing operating costs and current wants at the expense of future needs and future generations.

Now, let me turn to the state of the U.S. Government's finances, which is what I was asked to focus my testimony on today.

It is clear that the United States is a great nation, possibly the greatest in the history of all mankind. At the same time, our country is resting on its past successes and its sole superpower status, which is temporary, while at the same point in time, ignoring a range of leading indicators that clearly demonstrate that we are on an imprudent and unsustainable path in many respects.

This includes matters such as public finance, savings rates, educational performance, health care costs and outcomes, and the state of our Nation's critical infrastructure.

The truth is, our country's future standing and the standard of living for future generations of Americans is threatened by these key sustainability challenges, and given the subject of this hearing and series of hearings, I'll focus my remarks on America's structural deficits, growing debt burdens, increased reliance on foreign lenders, and low savings rates.

During the first approximately 200 years of our republic's existence, the Federal Government did not experience significant and recurring deficits, unless the country was at war, meaning a declared war, was experiencing a depression or recession, or faced some other major national emergency.

However, within the past several decades, both America and too many Americans became addicted to spending, deficits, and debt. This cultural challenge is real, and it has reached epidemic proportions in Washington, D.C.

As an example, total Federal debt levels have more than doubled in less than 10 years, and they could double again, within the next 10 years, on our present path.

Clearly, trillion-dollar deficits are a matter of growing public concern. However, it's important to understand that today's deficits do not represent the real threat to our ship of state. The real threat is the large, known, and growing structural deficits that will exist when the economy has recovered, when unemployment is down, when the wars are over, and when the crises have long passed. These literally threaten the future standing of the United States and the future standing of living of Americans; and as we can see, that absent dramatic and fundamental spending and tax reforms, our Federal debt levels are expected to skyrocket in the future. Believe me, the markets will not allow us to get nearly very far down this road.

Federal spending levels have grown by almost 300 percent net of inflation over the past 40 years, and the Federal budget is now dominated by mandatory spending programs that grow on autopilot. These mandatory spending programs serve to constrain our ability to invest in our children, in critical infrastructure, and other areas that help to create a better future.

As I have traveled the country and appeared to the media promoting the need for fiscal responsibility, many have asked, "Are we Greece?" Their question is based on the current challenges being experienced by that country, and the answer that I typically give is, the United States is not in the same situation as Greece today. However, our key public debt ratios will be as bad as Greece's in less than 10 years. And given our present path, we must learn the lessons of Greece and past history, if we want to avoid a similar crisis of confidence.

Today's paper notes, "Riots in the streets of Greece." This could happen in the United States in less than 10 years, on our present path.

Today's paper notes the dominance of concern in Britain about public debt. And as you will see, most Americans don't realize, including most Members of Congress in all likelihood, that our key total public debt ratios exceed Great Britain. They exceed Spain. They exceed Ireland. They're not as bad as Greece, but they'll be there within less than 10 years.

The truth is the debt to GDP numbers that the Federal Government pushes on the public, tend to understate the Nation's true leverage.

For example, current debt held by the public is about 58 percent of GDP and rising. However, if you add debt that's owed to Social Security and Medicare and other so-called trust funds, the debt to GDP ratio would be about 89 percent. And if you consider the debt that's held by Fannie Mae and Freddie Mac, which many believe should be consolidated with the U.S. Government's financial statements, we're well over 100 percent, and rising rapidly.

What about savings rates? Savings rates have declined dramatically, and the net national savings rate has plunged to the lowest level since the Great Depression.

We must recognize reality and understand that the four factors that caused the mortgage-related subprime crisis exist for the Federal Government's own finances: first, specifically, a disconnect between those who benefit from prevailing practices and those who will pay the price and bear the burden when the bubble bursts; second, not enough transparency as to the nature, extent, and magnitude of the real risk; third, too much debt, not enough focus on cash flow, and overreliance on credit ratings; and finally, a failure of existing governance, risk management, oversight, and regulatory functions to act until a crisis is at the doorstep.

In my view, in summary, while America is a great nation, we are at a critical crossroads. The decisions that are made, or that fail to be made by elected officials over the next 3 to 5 years, especially in the fiscal area, will largely determine whether our future is better than our past, or whether our best years are behind us.

We must move beyond delay and denial, we must start making tough choices, and we must do so before we pass a tipping point, which is what happened in Greece.

If you look what happens when you pass a tipping point and you lose the confidence of your foreign lenders, interest rates can escalate dramatically, which can set off a chain of events that not only would have adverse economic consequences in the United States, but dramatic adverse consequences around the world.

The United States will not default, but we may well have to pay much higher interest rates in the future because of not as much concern about default, but concern about what is the dollar worth that lenders will receive.

Thank you very much, and I'll be happy to answer your questions.

[The prepared statement of Mr. David M. Walker can be found on page 394 of the appendix.]

Chairman MOORE OF KANSAS. Thank you, sir, for your testimony.

Mr. Hoenig, thank you for testifying today, and for your 36-plus years of service with the Fed. You and your staff at the Kansas City Fed have been leaders in our community, and an invaluable resource as our country has slowly managed our way through the financial crisis.

As both you and Mr. Walker have pointed out, leverage is a double-edged sword and can be responsibly used for productive economic outcomes. But it seems, in the last decade especially, discipline was sacrificed for excessive risk-taking at times.

Would you elaborate on your point that, "the greater leverage reflects a significant funding cost advantage," for larger firms? I agree with your views that this represents a gross distortion of marketplace, and is an exploitation of an unearned advantage.

Can you help us better understand this point, sir?

Mr. HOENIG. I hope so. The way I would start, is if you look at my final comments, with how much additional capital it would take to have what I think is a reasonable leverage ratio in terms of tangible capital, you would have to raise over $300 billion equity.

Equity is more expensive, and therefore, by not having to raise that, to be allowed to have a higher leverage ratio, your cost of funding was, in effect, less, because smaller institutions, who are not "too-big-to-fail," of course, don't have that advantage.

So you really have biased the outcome towards the largest institutions. They don't have to raise as much capital; therefore, their costs are less; plus, they're thought to be "too-big-to-fail." Therefore, their credit costs, as well, are less than you would have in a regional bank that everyone knows could be closed if it were to fail.

So that's a huge advantage, and it perpetuates the ever-increasing size and consolidation of the financial industry, because, think about it. If you're on that borderline as being thought "too-big-to-fail," you have to go and get a merger partner and get above that threshold and bring your costs down. So it has a very perverse incentive system, that I think harms us.

Chairman MOORE OF KANSAS. Thank you, sir. At the end of your testimony, Mr. Hoenig, you note that critics will oppose more conservative capital ratios on the grounds it will restrict growth. You admit it will, but the point that everyone seems to miss is that runaway, excessive growth and dependence on leverage and debt is unsustainable and dangerous, and puts all Americans at risk.

We need to return to a more sustainable and responsive—do we need to return to a more sustainable and responsible use of leverage and debt; is that correct?

Mr. HOENIG. Absolutely correct, sir. I'm convinced—I have been told many times that, if you put these leverage constraints, you make it a rule of, say, 15 to 1, that during the growth period, you will constrain growth.

And my answer is, yes. That's the nature of sound fiscal management, that your capital requirements limit you. So if you want to go out and grow your balance sheet, you have to raise new capital to do so, which keeps it sounder, but also keeps the growth from running away.

So, under those conditions, under having firm rules, the capital ratios become countercyclical. When you allow them to move, they become less restrictive during the growth period and more restrictive during the recession. You get a procyclical outcome. The boom is bigger, and the recession is much worse. And that's what we want to avoid. I think this would do it.

Chairman MOORE OF KANSAS. Thank you, sir.

Mr. Walker, thanks for your years of public service, and what you have done to raise awareness about our long-term budget challenges.

First, I think you make a great point in your testimony that all debt and leverage is not bad, and with its responsible use, it can lead to productive economic activity. But like our addiction to foreign oil, and the dangers it poses to our national security, you note that, "our low savings rate and large spending appetite, America has become unduly reliant on foreign investors to finance our Federal deficits and debt."

Would you explain, sir, how our dependence on excessive debt may be a threat to our national interests in a little more detail, if you would, sir, please?

Mr. DAVID M. WALKER. Yes, I will.

First, the fastest-growing expense in the Federal budget today is not health care costs, although they do threaten our future. It's interests costs. Within 12 years, without a risk premium for interest rates, the single largest line item in the Federal Government's budget will be interest on the Federal debt, and we get nothing for that.

If we have to start paying a risk premium, say 200 basis points, or 2 percent, by 2040, the only thing the Federal Government could pay, based on historical revenue levels, is interest on the Federal debt. We get nothing for it.

So the fact is, we have to recognize that, by having excessive leverage, we are crowding out our ability to invest in our future. In addition to that, we are increasing the risk of passing a tipping point, whereas foreign investors may decide that they want to charge us higher interest rates in order to offset any potential risk, not as much of default, but of a significant reduction in the value of our currency and, therefore, their effective yield.

We are a great country, and we benefit from the fact that we have about 62 percent of the world's global reserve currency. That gives us more rope. It gives us more time. But ultimately, we are not exempt from the fundamentals laws of prudent finance; and yet we act like we are.

We're talking about our future national security, our future international standing, and our future standard of living.

I think we have to recognize reality. There are two kinds of taxes: current taxes; and deferred taxes. And to the extent that you run large deficits, those represent deferred taxes that will have to be paid with interest.

So this is not just an economic and national security issue; it's a moral issue.

Chairman MOORE OF KANSAS. Very good point. Thank you for your answer to my question, sir.

The Chair next recognizes Ranking Member Biggert for 5 minutes.

Mrs. BIGGERT. Thank you, Mr. Chairman.

Mr. Hoenig, the bill that is before us, the regulatory reform bill that Democrats have proposed, isn't it, if they have the "too-big-to-fail" that's a problem, isn't it likely that the leverage problems will become even worse in the future?

Mr. HOENIG. If we fail to address the "too-big-to-fail" issue, then the leverage issue and the consequence from that will only get worse through the next cycle.

In other words, all the banks are deleveraging right now, because of the pressure. But once the economy turns around and we begin to expand again, the leverage, the drive for leverage will increase as return on equity demands, return to investors becomes of paramount focus by that CEO, and the deleveraging will start again, and we will repeat the cycle, in my opinion.

That's why we need to have in the legislation, firm leverage rules that the rule of law then dictates that, inhibits that from happening, and it will, in fact, inhibit the growth of some of these largest institutions by taking their advantage away.

Mrs. BIGGERT. What, then, do we do when these—if they have funding advantages, and the creditors, since they seem to have a different status, the creditors will be more likely, when they monitor, not to be as vigilant when they look at the institution's leverage, so that it would go up.

Is that a potential problem, too?

Mr. HOENIG. As long as we do not address "too-big-to-fail," that is not a potential, but an immediate, real problem.

The creditors have to be under—that's why I prefer a rule of law that takes away discretion from the bureaucrat or from the policy person, so that in the crisis, you don't have that option to bail out, so that you have to take certain steps, controlled, to prevent a financial meltdown as such, but we can do that, and then the creditor knows that they will be in line, and they will get—

Mrs. BIGGERT. So it would be like an enhanced bankruptcy?

Mr. HOENIG. That's correct. An enhanced bankruptcy for a failure process that assures everyone that the largest institution will be dismantled if it fails.

Mrs. BIGGERT. Okay. How has recent Fed policy encouraged the use of debt financing?

Mr. HOENIG. In the sense of the last of this past cycle, I'm on the record as saying that when you keep interest rates exceptionally low for an extended period, you are encouraging credit, because of course, it's cheaper to borrow than to raise equity, it's more convenient, and therefore, you encourage credit. So you add to the incentives by keeping interest rates lower than they would otherwise be under normal market supply and demand conditions. So that's one of the issues we have to confront.

Mrs. BIGGERT. Thank you.

Mr. Walker, then, you point out some alarming numbers, and alarming other things, too. And thank you for your testimony. I hope you don't scare everybody to death.

Regarding the Federal debt, when you account for the debt owed to Social Security, Medicare, and the total GSE liabilities, what should be done regarding the GSE debt?

In other words, you talk about mandatory spending, and we have to reduce that? Really, discretionary spending is not near the amount of the mandatory. But how does the GSE liability fit in there, and what should be done with their debt, and can we continue to really continue to fund Fannie and Freddie as we're doing now?

Mr. DAVID M. WALKER. First, in my personal view, the debt that's owed to the Social Security and Medicare trust funds should be deemed to be a liability.

On one hand, we hold it out as an asset of the trust funds. We tell the beneficiaries of those programs that you can count on it, it's guaranteed by the full faith and credit of the United States Government, both as to principal and interest. We won't default on it. But yet, right now, it's not considered a liability.

And so, therefore, if it was, and by the way, it is part of the total debt subject to the debt ceiling limit, our current debt to GDP ratio would be 89 percent, and rising rapidly.

The issue of Fannie Mae and Freddie Mac is a little different. We do account for transactions, such as the $100 billion plus that we have already provided to them. The Treasury has now effectively guaranteed trillions of dollars of Fannie Mae and Freddie Mac debt. That's a contingent liability. But now, the Federal Government essentially controls Fannie Mae and Freddie Mac, and one of the questions that's going to have to be answered for this year's financial statements is, should they be consolidated into the financial statements of the United States Government.

Current accounting allows for that not to happen if it's temporary. It's not so clear to me how temporary this situation is, and so it's something that's very serious and we need to focus on it.

Bottom line, we're in worse shape than we tell people, and we need to recognize reality, that we're not exempt from the fundamentals of prudent finance. We also need to do what it takes to avoid what's happening in Europe right now.

Mrs. BIGGERT. Thank you. My time is up. I yield back.

Chairman MOORE OF KANSAS. Thank you.

The Chair next recognizes, Mr. Lynch, from Massachusetts. Sir, you have 5 minutes.

Mr. LYNCH. Thank you, Mr. Chairman.

I want to thank you both for your willingness to come before the committee here today, and I also thank you for the frankness of your testimony; and I share a lot of the same sentiments about where we're heading.

One of the particular areas I think that—let's go to the "too-big-to-fail" discussion. We talked about the 10 banks that really exceeded, by everyone's estimate, the existing capital structure regulation, and they accomplished that. We had regulations in place about how much leverage there could be for these banks.

What they did is, they used derivatives, they used these special purpose vehicles, used them by several names, but basically, in many cases, they contained these collateralized debt obligations, or collateralized loan obligations, and they moved that debt off their balance sheet.

And that way, they were able to stay within the regulatory framework, at least nominally, until it hit the fan, and these folks had to take all that stuff back on their balance sheets because there were no buyers, and those investments basically deteriorated.

That practice allowed these banks to become "too-big-to-fail," in my opinion.

I'm just wondering what you think about the Senate version of financial services reform, and also the House version, where we put some limits on these derivatives, we have established exchanges, which provides for transparency, we have provided for clearinghouses, and I'm a little bit nervous, because it still allows these clearinghouses to be owned by these 10 banks. As a matter of fact, 5 of the banks own 97 percent of all the clearinghouses, and that troubles me greatly.

But there's also a dark market that is maintained, for unilateral trading of these complex derivatives that go on between individuals. And so, I'm nervous about the perpetuation of this practice of moving stuff off the balance sheet, and that has allowed this leverage to go on.

I would just like to hear from each of you whether or not you think my fears are unfounded, or perhaps you might suggest a way of getting at that.

Thank you.

Mr. HOENIG. I think your fears are well-founded. I think the amount of off-balance-sheet activities with certain kinds of derivatives and synthetic derivatives have contributed to this crisis. I think that would be hard to refute, actually.

I do believe that the legislation should provide, number one, for better disclosure and for requiring these institutions to keep a portion of that on their balance sheet, whether it's 5 percent or 10 percent, so that you can monitor, and they have some skin in the game, if you will, to monitor that off-balance-sheet activity. That's number one.

Number two, on your exchanges, I'm very strongly supportive of a clearinghouse, but even exchanges, where you bring it to the light of day. A market discovery price is more available, people can, not behind the scenes this dark market manipulate to, say, push something so they can gain in a short position, and so forth.

I know there's a lot of discussion right now in the Senate on those particular industry players, but I think that can be dealt with, and the main objective should be to get transactions in the open, that is, a clearly regulated exchange or clearinghouse—it has rules that it abides by—would be the best outcome for the American people, and for the financial industry, actually.

Mr. DAVID M. WALKER. I think, clearly, with regard to the private sector, there's no question that there need to be tougher capital requirements, that also give appropriate consideration to derivatives.

In addition, there needs to be more transparency, no question, and better oversight than historically has been the case.

But let me remind you that you're correct, Congressman Lynch, that these special purpose entities and the use of derivatives didn't serve to mitigate risk but to enhance risk, which was part of the problem.

The Federal Government has special purpose entities, too. They're called trust funds. And one could argue that GSEs might be deemed to be special purpose entities, too.

So we need to practice what we preach. We need to do what we need to do with regard to institutions and instruments that represent systemic risk, but we also need to put our own financial house in order, and make sure that we're leading by example, and practicing what we preach.

Mr. LYNCH. Thank you. I yield back.

Chairman MOORE OF KANSAS. Thank you, sir.

The Chair next recognizes Mr. Driehaus for 5 minutes.

Mr. DRIEHAUS. Thank you very much, Mr. Chairman. Thank you for holding this hearing.

And I appreciate the testimony of the two witnesses. I think it's an issue that, while we talk about it from time to time on the surface, very rarely do people dig down and try to get toward solutions when it comes to our indebtedness.

I was very interested, Mr. Walker, specifically, in some of the solutions that you had focused on in your testimony, one of those being the issue of tax expenditures, which I think the vast majority of Americans pay very little attention to. This idea that we, as the Federal Government, forego over $1 trillion in tax revenue is very serious.

I describe it as a revenue stream that looks like Swiss cheese, because of all of the carveouts that exist, not just—and it happens in the States as well as in the Federal Government.

But what ends up happening is the rates that are then applied don't really bring in the revenue that it's suggested that they otherwise might. Instead, you have a situation where government is picking winners and losers in the economy, which only leads to a declining revenue stream.

The challenge, though, is that anytime you try to close one of those loopholes, anytime you try to close one of those intentional carveouts, you're accused of raising taxes.

As you look at The President's Commission to Address the Deficit and the Debt, how do we treat the Tax Code, especially tax expenditures, so that they're no longer being viewed as political football, but that we have a long-term, sustainable tax policy that businesses in the United States can actually count on, while actually lowering the rates, in my opinion, because I think you can close a lot of loopholes, and dramatically lower the rates.

But I would be very interested in your comments.

Mr. DAVID M. WALKER. First, there are two kinds of spending. There's front-door spending, which is about $3.8 trillion for this year. And there's back-door spending, which is the revenue that we lose because of tax preferences, deductions, exemptions, exclusions, credits, etc., over $1 trillion a year.

They're not in the budget. They're not in the financial statements. They're not part of appropriations. And they're not systematically reviewed for reauthorization. That has to change.

We have to take a hard look at them to understand whether or not their future focused, results oriented, to try to understand who is benefitting from them. And, in many cases, quite frankly, they fuel problems.

For example, the largest tax preference is the exclusion from individual income and payroll taxes of employer provided and paid health care. That fuels health care cost increases. It creates great inequities between the haves and the have-nots.

So I think it's important that be on the table. It has to be part of comprehensive tax reform.

And, quite frankly, I think ultimately the Federal Government is going to have to employ a special process, possibly with outside experts, to go through a disciplined, independent review of major spending programs, both front-door and back-door, and to make recommendations on what the Congress should consider doing to put us on a more prudent and sustainable path.

There's no question that we need comprehensive tax reform, and that if we broaden the base, we can keep rates low and, in fact, potentially even lower, especially on the corporate side, for competitiveness reasons.

At the same point in time, I can also tell you that, because of a very simple principle, math, taxes are going up. There's no way that we can solve our structural fiscal imbalance solely on the spending side—although my personal view is we have to do more on the spending side of reprioritization and constraint than on the revenue side—but we're going to have to have more revenues.

And the longer we wait to come to the realization that we have to make tough choices on both sides, the bigger the change is going to have to be, the less transition time, and the more risk of passing a tipping point.

Mr. DRIEHAUS. Would you support a systemic process within the Congress, a litmus test, if you will, so that any Member, coming before the Ways and Means Committee or any other committee, with a tax expenditure, would have to meet a set of criteria in order for the tax expenditure to even be considered?

Mr. DAVID M. WALKER. Absolutely. I think we need a set of criteria for direct spending and indirect spending.

Believe it or not, this country has been in existence since 1789, and it has never had a strategic plan.

Believe it or not, this country doesn't have a set of outcome-based indicators—economic, safety, security, social, environmental—to assess what's working and what's not, and how do we compare to others.

Believe it or not, we have never gone through a systematic review of major tax preferences or spending programs to find out whether they're future-focused, delivering results, affordable, and sustainable.

It's about time.

Mr. DRIEHAUS. Mr. Hoenig, I don't know if you have any comments on tax—

Mr. HOENIG. I would answer one thing, though, that plays on this, that I think is important.

If we don't address the issues, front-door, back-door, the issues you're bringing up, I'm absolutely confident that there will be mounting pressure on the Federal Reserve system to help finance this through monetization of debt, and the outcome for that for this country is inflation at some point in the future. And of course, that is a tax.

Mr. DRIEHAUS. Yes.

Mr. HOENIG. And it's the most regressive tax we can put on the American people.

So it's important, I agree so much with Mr. Walker, that we address this starting now in some systematic fashion, or we will pay dearly a generation, or a lot sooner than that, ahead of us.

Mr. DRIEHAUS. Thank you, Mr. Chairman.

Chairman MOORE OF KANSAS. We have a little bit of time left. If it's okay with the witnesses, if you're okay with this, we're going to each ask one more question, if that's all right, if people have the questions.

Mr. Hoenig, when considering a leverage ratio cap of 15 to 1, would you include off-balance-sheet assets in that number, and how do those get considered in monitoring leverage?

Mr. HOENIG. What I would tend to do is require a portion of the off-balance-sheet to be counted on the balance sheet.

If you originate it and push it out, you keep a portion of it, and then your leverage against that.

Because I think the fact that you constrain the leverage to that very hard number, and keep a fair amount of the off-balance-sheet then in your calculation, you will constrain the use of off-balance-sheet activities. Otherwise, it becomes very complex.

One of the issues in our past crisis around capital is, frankly, the Basel capital standards, which were so complex that they were gamed almost immediately by the institution that wanted to leverage out.

So the simpler, the more direct, the better.

Mr. DAVID M. WALKER. If I may, Mr. Chairman—

Chairman MOORE OF KANSAS. Mr. Walker, yes, sir.

Mr. DAVID M. WALKER. —on that.

First, to me there's a difference between how do you treat them for capital requirements and for regulatory purposes, and what do you do with them from an accounting standpoint.

I don't think that Congress should set accounting standards. We could be in real trouble if that happens. But I do think that you have to give consideration, as has been mentioned, about what do you do for purposes of capital requirements and regulatory heft.

Chairman MOORE OF KANSAS. Thank you, sir.

The Chair next recognizes the ranking member, Ms. Biggert, if you have a question.

Mrs. BIGGERT. Thank you, Mr. Chairman.

This testimony has been really, really good. Thank you.

Could you just, each of you, say what would be the first three things that you would do right now, that we can do immediately, to stop the bleeding, to stop the debt increase?

We'll start with you, Mr. Walker.

Mr. DAVID M. WALKER. First, tell the American people the truth, which is what we're trying to do, about where we are, where we're headed, how do we compare to other nations, the benefits of acting sooner rather than later, the dramatic kind of changes we're going to have to make, and the potential adverse consequences to our country and their families if we don't.

That means engaging the American people outside the Beltway in ways that haven't been done, representative groups. And frankly, we're going to fund, along with the MacArthur Foundation and the Kellogg Foundation, an effort to do so in 19 cities around the country on June 26th of this year, but that's just a beginning.

We also are publishing this Citizens' Guide and distributing it, and each of you have a copy.

Secondly, I think next year, we should reform Social Security to make it solvent, sustainable, secure, and more savings-oriented. It's a lay-up. You can miss a lay-up. But it's a high-percentage shot.

I think there's pretty much a parameter of what needs to be done there. Social Security is not our biggest problem, but it would be a credibility enhancer and a confidence builder.

Secondly, next year, I think we should enact statutory budget controls—spending constraints, etc.—that will take effect once we hit certain triggers relating to economic growth and unemployment.

And then, beyond that, I think that we need to set the table for what will be very tough choices for health care cost reduction, which the last bill really didn't do much on, and for comprehensive tax reform that will improve the economic growth, enhance our competitive posture, and generate more revenues.

Those things, I think, are going to have to be done together, because they're going to involve very tough choices and you're going to have to do tradeoffs and probably deal with it as a package.

Mrs. BIGGERT. Thank you.

Mr. Hoenig?

Mr. HOENIG. I would add—I think those are great suggestions—I think there needs to be brought forward to the American people a realization that we have to engage in a shared sacrifice, if you will, that we're all going to have to take a hit, because I find that we all want to do this, but not for our particular area, our particular project. And there has to be this education, communication that would take that forward.

I think that has to also be incorporated into the congressional process. In other words, we are going to take this forward as a Congress, not as a party, and so we can deal with this.

And then I do agree, we need to put budget constraints on ourselves that force us then to then face up to these shared sacrifices and these cuts and these taxes that are ours to face.

Mrs. BIGGERT. Thank you.

Chairman MOORE OF KANSAS. Shared sacrifice. What a radical notion. That's really something I agree with.

You're recognized, Mr. Lynch, for up to 5 minutes.

Mr. LYNCH. Thank you. Thank you, Mr. Chairman.

Mr. Walker, you're passing comment regarding the recently passed health care bill, and I cannot ignore that.

I'm one person who voted against that for precisely the reason that you raised, that the idea at the beginning of the health care debate was that, since we were paying 3 times as much as any other nation on health care, that we would squeeze down the costs and use the savings to pay for some health care for the people who weren't covered.

And I know I disagree with a lot of my colleagues on this, but, it's sort of like throwing an anchor to a drowning man, from a budgetary standpoint, committing $1 trillion when we have all these problems on our plate.

Mr. Hoenig, I read your comment on that, and I think both of you have said that we have to realize that the rules of finance apply to us, and that goes for the Fed, that goes for Treasury, and that goes for the people in Congress, and to the President, that the rules of finance apply to us.

And sometimes around here, we act like there's no connection at all to what we do and what we pass and someone who's going to have to pay the bill somewhere down the road.

I read recently, in my clips here, I can't track it down, but Moody's—and this was regarding the discussion with Greece and Spain and Portugal and Ireland, and Moody's—someone at Moody's made a statement that the United States ought to be careful, because based on the amount of debt that we're acquiring here, and the track that we're on, that we could lose our AAA bond rating, and that would be devastating, to increase greatly the cost of our borrowing, and the loss in confidence in the United States.

And I was wondering if you could comment on that, and what the repercussions might be if the financial markets, given how we're running our business here, called the United States of America, if there were loss of confidence and we were to lose that AAA bond rating.

Mr. HOENIG. I think your concern is very legitimate. And I—whether it's a financial institution or a company or the U.S. Government, I have a saying that, based on my experience, once there is a shred of doubt, it's too late.

Mr. LYNCH. Right.

And so, we're now in a position where we see this wave coming at us, and we can do something about it. But once it gets to our shores, if you will, and this doubt enters, then we will see it reflected in our interest rates, in our value of our currency, and in our future wealth.

So we need to do it now. Doubt is going to be the outcome, and that will be a very expensive proposition for us all.

Mr. DAVID M. WALKER. About a year ago, the major rating agencies downgraded the outlook for Great Britain to maintain its AAA credit rating. It didn't downgrade their rating. It downgraded the outlook.

Our ratios on total public debt are worse than Great Britain. If we fully accounted for the trust fund obligations and other activities, even with regard to the Federal level, they're worse.

And so I think the fact of the matter is, we benefit from having 62 percent of the world's global reserve currency, and secondly, home team bias. Most rating agencies are based here.

And in my view, there's absolutely no question, on the path that we're on, one would have to seriously question how long we will retain a AAA credit rating under our current path. We shouldn't get to that point.

And that's why, last month, we surveyed about 100 top former leaders, from Congress, the Executive Branch, and the Federal Reserve. Chairs and ranking members of Finance, Ways and Means, the Budget Committees, Treasury Secretaries, Fed Reserve Board members, Treasury Secretaries, OMB directors, CBO directors.

There was 100 percent agreement, with a 60 percent response rate roughly, that we're on an unsustainable path. Super-majority agreement that we must take concrete actions within 1 to 2 years to avoid the risk of passing a tipping point. Numbers like that are clear and compelling.

So we have to move past denial. We have to move past delay. We need a plan, and we have to start acting.

Mr. LYNCH. Thank you both.

I yield back.

Chairman MOORE OF KANSAS. Thank you, sir.

Mrs. BIGGERT. Mr. Chairman, could I ask unanimous consent to allow Mr. Royce from California to—he's a member of the general committee, but—

Chairman MOORE OF KANSAS. Certainly. Without objection, it is so ordered.

Mr. Royce, you're recognized for 5 minutes.

Mr. ROYCE. I appreciate it, Mr. Chairman.

I had a question for Mr. Hoenig.

In a recent book co-authored by two economists, Rogarth and Reinhart, they note the painful consequences of the rising government debt load that often follows financial implosion, or a financial crisis. And despite vocal warnings from economists, the United States is following the pattern that they set out, rather blindly.

We were overleveraged prior to the financial crisis, but the Federal Reserve and the U.S. Government have lent or spent or guaranteed about $8.2 trillion to prop up the economy in the last 2 years.

And a quarter—you also throw into the mix here that Chairman Bernanke has said our budget deficits and the budget proposal put forward by the Administration, going forward, is unsustainable. So we don't see things getting better with these trillion dollar deficits that we are budgeting for now.

The IMF and the OECD are projecting that the stock of public debt in advanced economies is going to double and reach an average level of 100 percent of GDP in the coming years.

So I would ask you, we have been through a financial crisis where much of the private sector debt was simply transferred to the Federal Government. In essence, that's the bottom line. And that's contributed, then, to these unsustainable Federal deficits.

So where does this road lead; and do you foresee a financial crisis that now morphs instead into a sovereign debt crisis here in the United States?

Mr. HOENIG. I think that the steps that were taken in the crisis to staunch it, to end it, were taken aggressively. I think now we have to be prepared to reverse that, and we need to do it carefully and systematically, but we need to reverse it.

These debt levels that we have been talking about here this morning, whether it's the financial institutions, the Federal Government, and even the Federal Reserve's balance sheet, need to be addressed and reduced. And I think that's paramount.

Or, as Rogarth and Reinhart have shown, we will compromise our future and, as we have been talking here this morning, it will as well, and I think, as I said earlier, there will be increasing pressure.

If this isn't addressed sooner and systematically, and people don't have confidence that we're going to address it, then we will see pressure for the Federal Reserve to monetize more of this debt, inflationary pressures will rise, and there will be a strong impact on the dollar, long-term, and on our Nation's wealth.

So it's—

Mr. ROYCE. That is the concern of a number of economists, that the path of least resistance here might be runaway fiscal deficits which will then be monetized by the Federal Reserve.

I think you recently gave a speech highlighting the possibility that Congress could soon be knocking on the Fed's door to monetize the debt.

Mr. HOENIG. Right.

Mr. ROYCE. Are you concerned with the precedent that has been set by the Fed in this regard, because last year, the Fed bought $1.8 trillion of Treasury securities and agency debt?

And the other issue that I just asked about, which comes out of that same book by Rogarth and Reinhart, is that the buildup of excessive debt, they say, inevitably leads to stagnant economic growth going forward, which you alluded to. Clearly, there is the need for deleveraging that lies ahead for our economy, both in government and privately held debt, and instead, we seem to be piling on, especially if you look at the increases in all of the agency spending, the appropriations, the separate appropriations bills, which go up by double digits.

Do you foresee a stagnant economy, as long as this level of debt remains? What's your forecast here?

Mr. HOENIG. First of all, yes, I am concerned by the precedent set, and I think we need to, that's why I say we need to reverse that quickly to bring our balance sheet back down. We need to do it systematically and carefully, but we need to do it.

If we don't, and we get ourselves into an environment of growing debt, unsustainable, as Mr. Walker had pointed out, and we then put pressure to monetize it, which would cause us to have inflation, we will endanger our economy and stagnation is a possibility. It's unavoidable, if we don't take action now.

Mr. ROYCE. Thank you, Mr. Hoenig.

Mr. DAVID M. WALKER. Congressman, if I can respond quickly?

Mr. ROYCE. Absolutely.

Mr. DAVID M. WALKER. First, on my testimony, I talked about the four parallels between the factors that caused the mortgage-related subprime crisis and the Federal Government's own finances. We need to learn lessons from that.

Secondly, with regard to the book you're referring to, I think it refers to the fact that once you have debt equal to about 90 percent of the economy, then it has an adverse effect on economic growth; and once you get to 100, it's very troubling.

If you count the Social Security and Medicare debt, we're at 89 percent, and growing rapidly. That doesn't count the GSEs and things of that nature.

And then lastly, you can't monetize your way out of this problem, and let me tell you why: because, while monetizing your way out, which creates an inflation risk, might help deal with the current debt, and lessen the burden of the current debt, the real threat to the future of this country is the $45 trillion in off-balance-sheet obligations, $38 trillion for Medicare alone, that grows faster than inflation and faster than the economy.

You have to make tough choices. You need to do it within 2 years, at least to start, or else we could be facing something that we don't want to see in this country.

Mr. ROYCE. Thank you.

Chairman MOORE OF KANSAS. I thank the gentleman.

And I would, at this time, like to thank our panel members here, Mr. Hoenig and Mr. Walker, for your testimony, and for answering our questions. It has been a very, very good exchange, and I very much appreciate that.

I'm advised that votes will be called in the very near future, probably in the next 5 to 10 minutes, and I would like to excuse the first panel, and again thank you for your testimony and your service, and ask the second panel members to be seated so we can maybe just get at least preliminarily started here, and then move on.

Thank you again.

I'm pleased to introduce our second panel of witnesses, and please work with me and forgive me if I mispronounce any names here.

First, we will hear from Ms. Orice Williams Brown, Director, Financial Markets and Community Investment at GAO.

Next, will be Professor John Geanakoplos, James Tobin Professor of Economics at Yale University.

Then, we'll hear from Professor Viral Acharya—excuse me. Will you pronounce it, sir? Okay—Professor of Finance, Stern School of Business at New York University.

And finally, we'll hear from another David Walker, a different David Walker, Professor David A. Walker, who is the John Largay Professor at the McDonough School of Business at Georgetown University.

Without objection, your written statements will be made a part of the record.

Ms. Williams Brown, you're recognized, ma'am, for 5 minutes.

STATEMENT OF ORICE WILLIAMS BROWN, DIRECTOR, FINANCIAL MARKETS AND COMMUNITY INVESTMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO)

Ms. WILLIAMS BROWN. Thank you.

Chairman Moore, Ranking Member Biggert, and members of the subcommittee, I appreciate the opportunity to testify before you this morning on the role of leverage in the recent financial crisis.

As you know, the Emergency Economic Stabilization Act of 2008 mandated that GAO study the role of leverage in the crisis. My statement today is based on that report.

While the report covers a wide range of issues, I would like to highlight a few key points concerning how leverage is defined, its cyclical nature, how it's constrained, and regulatory limitations.

The buildup of leverage during the market expansion, and the rush to reduce leverage or deleverage when market conditions deteriorated, was common with this and past financial crises.

Leverage traditionally has referred to the use of debt instead of equity to fund an asset, and has been measured by the ratio of total assets to equity on the balance sheet. But the recent crisis revealed that leverage can also be used to increase an exposure to a financial asset without using debt, such as by using derivatives.

Given the variety of strategies to achieve leverage, no single measure can capture all aspects of leverage.

Our findings concerning the role of leveraging and deleveraging in the recent crisis reveal that leverage steadily increased within the financial sector before the crisis began in mid-2007, and banks, securities firms, and others sought to deleverage and reduce their risk during the crisis.

While this work, which builds upon the work of others, suggests that efforts taken to deleverage by selling assets and restricting new lending could have contributed to the crisis, others noted that the crisis was the result of prices reverting to their fundamental values after a period of overvaluation.

These varying perspectives illustrate the complexity of the crisis, and, given the range of assets involved, are not necessarily contradictory.

Moreover, some argue that leverage created vulnerabilities in the market that increased the severity of the crisis.

In addition, subsequent disorderly deleveraging by financial institutions may have compounded the crisis.

For example, some studies suggest the efforts taken by financial institutions to deleverage by selling financial assets could cause prices to spiral downward during times of market stress, and exacerbate a financial crisis.

Second, the studies suggest that the deleveraging by restricting new lending could slow economic growth. However, other theories also provide possible explanations for the sharp price declines observed in certain assets.

The issues raise questions about how leverage is constrained, which varies by type of institution.

For example, for federally regulated institutions, regulators can limit leverage through minimum-risk-based capital, leverage ratios, and liquidity requirements. However, for other institutions such as hedge funds, market discipline supplemented by regulatory oversight of institutions that transact with them, conserve to constrain their use of leverage.

The crisis revealed limitations in the regulatory approaches used to restrict leverage.

For example, regulatory capital measures did not always fully capture certain risks, which resulted in some institutions not holding capital commensurate with their risk and facing capital shortfalls when the crisis began. Moreover, regulators faced challenges in countering cyclical leverage trends.

The crisis also revealed that, with multiple regulators responsible for individual markets or institutions, none has clear responsibility to assess the potential effect of the buildup of system-wide leverage or the collective effect of institutions' deleveraging activities.

Finally, a lesson of the crisis is that an approach to supervision that focuses narrowly on individual institutions can miss broader problems that are accumulating in the financial system. In that regard, regulators need to focus on system-wide risks to and weaknesses in the financial system, not just individual institutions.

In closing, I would like to note that, since the onset of the crisis, regulators have continued to re-evaluate capital standards, namely, Basel II, and the countercyclical nature of leverage and capital.

However, efforts to monitor leverage must include a mechanism to evaluate the amount of leverage in the system, in order to better identify and mitigate potential systemic risk.

Mr. Chairman, Ranking Member Biggert, this concludes my oral statement, and I would be happy to answer any questions at the appropriate time.

[The prepared statement of Ms. Williams Brown can be found on page 214 of the appendix.]

Chairman MOORE OF KANSAS. Thank you for your testimony.

The Chair next recognizes Professor Geanakoplos.

You're recognized, sir, for 5 minutes.

STATEMENT OF JOHN GEANAKOPLOS, JAMES TOBIN PROFESSOR OF ECONOMICS, DEPARTMENT OF ECONOMICS, YALE UNIVERSITY

Mr. GEANAKOPLOS. Thank you for inviting me to talk today about managing leverage, managing the leverage cycle.

For a long time, we have recognized the need to manage interest rates. That's what the Federal Reserve does. But we don't have a regulator to manage leverage. And I have written about this for 10 or 15 years.

I wasn't the first one to think of this idea. Shakespeare, 400 years ago, in The Merchant of Venice, explained, in a negotiation over a loan, you had to figure out not only the interest rate but also the collateral. And if we ask, which did Shakespeare think was the more important, nobody can remember the rate of interest that Shylock charged, but everybody remembers the collateral, the pound of flesh.

The play ends, by the way, with the regulatory authority of the court deciding not to change the interest, not to change the principal, but to change the collateral. It should have been a pound of flesh, but not a drop of blood. And that's what I'm advocating today, that we manage leverage, and not manage—pay so much attention to interest rates.

I'm talking about securities leverage. When you have a house at 20 percent downpayment, that means a 5 to 1 leverage, the cash divided into the amount of assets. That's what I'm talking about.

The reason I wrote about this is, there's a puzzle in economics: how could it be that one supply-equals-demand equation determines two things, the interest rate and the leverage, or the amount of collateral? In my theory, it does. I resolved that problem.

So leverage is important for three reasons, two of which people know: The more leveraged you are, the riskier your situation. If the asset changes by 1 percent, your profits go up by 5 percent, if you leverage 5 to 1. Also, there's no recourse aspect of collateral. You can walk away from your house, and if the house goes to zero, you lose the $20 you put down.

But there's a third aspect of leverage that didn't get so much attention, which is the main thing I have called attention to, which is that, with a lot of leverage, a very few people can own all the assets, and the implication of that is, the more leverage in the economy, the higher the asset prices; the less leverage, the lower the assets prices.

The reason for that is, if you think of people, the buyers, on a continuum for the most enthusiastic at the top to the least enthusiastic, wherever the price is, the people above who are going to think that it's a good deal, and they'll be buyers; the people who are less optimistic will think that it's a bad price, and they'll be sellers.

If you allow leverage in the system, the marginal guy, the guy on the threshold of buying or selling, his opinion is determining the price. If leverage goes up, you need fewer people at the top to buy all the assets. The marginal guy, on the threshold, is higher, and so the price now reflects his opinion, which is a higher opinion, because he's a more optimistic person. That's why prices go up when there's more leverage.

The reason for this heterogeneity between people more if some people are more risk-tolerant, some people like to live in the houses more, many reasons, some people are more optimistic.

So the leverage cycle is that there's too much equilibrium leverage in normal times, and therefore, too high asset prices, and then suddenly there's too little leverage in a crisis, and therefore, too low asset prices. And this bouncing up and down of asset prices is very harmful to the economy.

The crisis always begins the same way. There's bad news, but it's not just bad, it's scary. For example, they tell you your plane is 10 minutes late. Well, 10 minutes isn't so bad. It's that you start to worry maybe it's going to be an hour or two late.

A bank announces it's going to lose $5 billion. That's not the end of the world. But if it's going to lose $5 billion, maybe it will lose $10 billion. And that's what you're worried about.

Or delinquencies in the home—homeowner delinquencies go from 1 percent to 5 percent. The real problem is people now think they might go to 30 percent.

So the next stage is, the lenders get nervous, and they cut lending, and they increase margins, and leverage starts to collapse, and then the optimistic buyers, when the prices are going down, they lose all their money.

So a price might go down from 95 to 69, not because anybody thinks their own information justified—the bad news isn't enough for anyone to think it should go down that far.

But the optimists who bought at the beginning, the top 13 percent, say, when the price starts to go down, they get wiped out.

Then the next group, who's going to buy after the crash, the next group are not only not as optimistic, but they can't borrow the money to buy it. So it takes a lot more of them to buy it.

And so the marginal buyer goes way down, way below where he was before, and the price is lower, not because of the bad news alone, but because of these, the bankruptcy of the optimists and also because leverage is so far down.

So that's my theory. And this has recurred over and over again, in 1994, 1998, 2007.

So just to show you some data, there's a famous graph. That green curve, which is Schiller's home price data, it went from 2000 at 100, 90 percent up, to 190, and then dropped to 130. And he called it irrational exuberance.

But if you look at the downpayments, the purple, it went from, measured from the top, 14 percent down to 2.7 percent down, and then to 20 percent down. It reached the peak at exactly the same time.

If you look at toxic mortgage security prices, they collapsed, went from 100 to 60, and now they're going back up to 80.

If you look at the blue line, that measures downpayment again, in reverse direction, you see that leverage suddenly collapsed, and leverage went back up, and that's why prices are going back up.

So, the leverage cycle was worse this time than all the previous times—I'm just going to go 20 more seconds—worse this time than all the previous times because the leverage wasn't just a few financial institutions, but millions upon millions of homeowners, and so we had a double leverage cycle, millions of people plus our financial institutions, and also we introduced CDS, which is another way to leverage.

So, what should we do about the leverage cycle? The most important thing to do is monitor leverage, securities leverage.

Go to all the big financial institutions and ask, "What is the downpayment you're requiring for housing, for securities that people are buying," and publish that data every month, and also measure people's leverage. Put CDFs on exchange and regulate leverage in normal times. Don't let banks make 2 percent downpayment loans on houses and banks lending on mortgage securities.

The last thing is, people keep—this is my last slide—people talk about monitoring leverage with the 15 percent rule that has been advocated by the previous panelists. In my opinion, that's a mistake. We should be looking at leverage at the securities level, not at the investor leverage. What's the downpayment on securities?

Leverage can move from one institution to another. If you require 15 percent for some institutions, it will move to some other place. People can lie about their leverage. You can't lie about what the downpayment is, because there are two people you can check what the downpayment was.

Thirdly, and most importantly maybe, leverage at the investor level goes in the wrong direction. When there's a crisis, and it's hard to get a loan, and the downpayments go way up, the bank, the investor leverage looks like it's going up, because their equity is disappearing, so debt to equity is going up, just when the leverage is actually collapsing in the system. And also, there's less pressure on a regulator to monitor security leverage.

So I went over. Thank you.

[The prepared statement of Professor Geanakoplos can be found on page 232 of the appendix.]

Chairman MOORE OF KANSAS. Thank you, sir, for your testimony.

The Chair will next recognize Mr. Acharya—is that correct, sir—for up to 5 minutes.

And I would advise the people in the room here that votes have been called. We have about 10 to 12 minutes, I think, for votes. So if we can get both of these last remaining witnesses for 5 minutes each, we would appreciate that.

Sir, you're recognized.

STATEMENT OF VIRAL V. ACHARYA, PROFESSOR OF FINANCE, STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY

Mr. ACHARYA. Thank you, Mr. Chairman, and members of the subcommittee.

Along with my colleagues at the Stern School of Business, New York University, I have co-edited two books on the financial crisis and co-authored research papers that help understand how the financial sector escalated its leverage before the crisis, and what can be done about it in future. Much of what I say today is based on this research.

We seem to witness, on a somewhat regular basis, episodes in which financial intermediaries are all overextending credit, and are themselves funded with excess leverage. When the economic cycle turns downward, they fail in a wholesale manner requiring massive government interventions.

While leverage has its bright side in expanding finance for households and the real economy, its dark side is precisely this boom-and-bust cycle. Unfortunately, this dark side has become enduring.

With each cycle comes in place, more government intervention and guarantees of financial sectors debt, some explicit, such as deposit insurance, and others implicit, such as “too-big-to-fail,” or “too-systemic-to-fail.”

The result is that financial firms find it cheap to borrow and post their returns without sufficient regard for risks.

One of the most salient such episodes was the period since 2004, during which the financial sector in the United States, and in many parts of the Western world, grew its balance sheet at an unprecedented speed, and did so mainly through leverage.

There were three primary failures, in my view, that led to this escalation of leverage: one, access to government guarantees that were not paid for, especially for the commercial banks and Government-Sponsored Enterprises; two, ineffective enforcement that allowed bank regulation to be arbitraged—that is, circumvented by a sophisticated financial sector; and three, in case of investment banks and the insurance sector, simply poor design of regulation.

The end effect of these failures was that large and complex financial institutions, 10 of which owned over 50 percent of the financial sector’s assets, operated at historically high leverage, in some cases exceeding 25 to 1, or, in other words, $24 of leverage on a $25 balance sheet.

Much of this leverage was undertaken in the shadow banking world, the less-regulated, or unregulated part of the financial sector.

This part of the financial sector consists of off-balance-sheet entities that are connected to, but do not appear on bank balance sheets, borrowing and lending between financial firms, including through repos, or repurchase agreements, and the over-the-counter derivatives.

Much of this leverage was also short-term in nature, to be rolled over each night or week, and yet it funded long-term and illiquid assets, such as subprime loans.

This exposed the financial system to great risk from a secular economic downturn, and because the leverage was highly opaque, when financial firms failed, uncertainty about how losses would transmit to others paralyzed the system. In the end, the government and the Federal Reserve ended up bearing much of the losses.

What can be done to deal better with this boom-and-bust cycle of leverage in the financial sector?

In the interest of time, I’ll focus only on those regulatory options that directly deal with leverage in good times.

First, current capital regulation does not take into account the leverage structure of a financial firm’s balance sheet. This major shortcoming should be addressed, for instance, by imposing a tax on leverage, or better, by introducing upper limits on leverage, such as 15 to 1, as has been employed successfully in other countries such as Canada; or better still, by embedding leverage information in supervisory tests to assess whether banks can withstand extreme losses in economic downturns.

Second, the regulation of the shadow banking world needs to be brought in line with the on-balance-sheet regulation of financial firms. Any attempt to regulate leverage that ignores the shadow banking world would only lead to further growth of off-balance-sheet forms of leverage.

In addition, greater transparency of the shadow banking world needs to be legislated so that regulators and market participants have timely and accurate information to understand and, if needed, restrict and discipline the leverage of financial firms.

And last, but not least, the government should plan for a graceful exit from the large number of guarantees provided to the financial sector, not just as part of the rescue package in 2008, but from well before. In particular, reform of the financial sector should also include reform of the Government-Sponsored Enterprises.

I'll be happy to provide more detailed proposals on these during the question-and-answer period. Thank you, Mr. Chairman.

[The prepared statement of Professor Acharya can be found on page 44 of the appendix.]

Chairman MOORE OF KANSAS. Thank you, sir. Mr. Walker, you are recognized for 5 minutes. And votes again have been called, but I think we have time for your testimony.

We're going to hear your testimony, then we're going to take a break for votes, and we'll be back for questions.

STATEMENT OF DAVID A. WALKER, JOHN A. LARGAY PROFESSOR, McDONOUGH SCHOOL OF BUSINESS, GEORGETOWN UNIVERSITY

Mr. DAVID A. WALKER. Thank you.

Chairman Moore, Ranking Member Biggert, and subcommittee members, thank you for this opportunity to testify in front of the House Financial Services Oversight and Investigations Subcommittee.

I'm David A. Walker, the John A. Largay Professor in the McDonough School of Business at Georgetown University.

Large firms that are managing their risk effectively are not necessarily too big, and our economy needs their services. Some mismanaged firms needed greater regulation. Some aggravated the financial crisis, and many of those have already failed. Breaking up a large firm that shows unreasonable risk would be much preferred to future bailouts.

There are three recommendations I would like to offer to the committee: one, merge the Office of Thrift Supervision into the Office of the Comptroller of the Currency, as soon as possible; two, do not subject small insured depository institutions to unnecessary additional capital restrictions—Basel I and Basel II are more than sufficient; and three, assign consumer financial protection responsibility to the FDIC, without creating a new agency and an additional bureaucracy.

For the record, I submitted copies of two papers: a peer-reviewed study on long-run credit growth in the United States, co-authored with Dr. Thomas Durkin, former senior economist with the Federal Reserve, and my Georgetown colleague, Professor Keith Ord; and a second policy paper on impacts of TARP on commercial banks, with Max Gaby.

The issue Durkin, Ord, and I analyzed is how levels of consumer credit have changed over the past 60 years. Surprisingly, we show that the aggregate real consumer credit, adjusted for price increases, and excluding mortgage credit, has increased at about the same annual rate as real U.S. disposable income.

Conclusions with regard to mortgage credit are very different, and with subprime lending, every segment of the industry had abuses.

Perhaps the greatest problem in the housing crisis was poor supervision by the Office of Thrift Supervision. The failures of IndyMac and Washington Mutual were holding company thrifts supervised by the OTS. I believe that if all holding companies were supervised by the Fed, the results would be somewhat different. This would be just one more example where the independence of the Federal Reserve is essential.

I'm a strong proponent of merging the OTS into the Office of the Comptroller of the Currency, and I wish the Congress could pass such a separate bill to accomplish this very quickly.

Mark Flannery has proposed requiring large banks to hold debt instruments he calls contingent capital certificates. They would automatically convert from debt to equity if the market value of a large bank's equity fell below an established threshold. This eliminates regulatory delays and negotiations when a large bank might be in jeopardy.

Leverage of insured depository institutions can be examined by a simple ratio that I have talked about in my testimony, where you take liabilities minus deposits as a ratio to Tier 1 capital. My research shows that risky large banks and large savings and loans could be identified by this ratio.

I recommend that you not create a new government agency for consumer financial protection. Please consider placing the responsibility within the FDIC.

As an independent agency, with separate budget authority, many necessary consumer protection systems already in place, and an existing Consumer Affairs Department, the FDIC is ideally suited, in my opinion, to implement the consumer financial protection that the Congress deems necessary.

The aggregate fiscal debt in the United States has increased dramatically since World War II under both Republican and Democrat—

Chairman MOORE OF KANSAS. Mr. Walker, may I interrupt you? And I apologize for doing this. We have 2 minutes and 15 seconds left before the conclusion of votes, so I think we're going to have to stand in recess right now, and I would ask you if you would finish your—

Mr. DAVID A. WALKER. Sir, I could finish in 30 seconds.

Chairman MOORE OF KANSAS. Very good. Thank you.

Mr. DAVID A. WALKER. The IMF establishes a 5 percent country target maximum of fiscal deficit ratio to GDP. The Honorable David Walker has already talked about this in great detail, and I wouldn't attempt to repeat what he says. I just want to also urge the subcommittee not to burden the United States with any further taxes that are regressive, like the VAT tax.

That concludes my testimony, and sir, I'm sure you appreciate that for academics to do anything in 5 minutes is monumental.

[The prepared statement of Professor David A. Walker can be found on page 308 of the appendix.]

Chairman MOORE OF KANSAS. Same thing for Congress. And we're going to stand in recess right now. I thank the witnesses. We'll be back probably in about 20 or 25 minutes. If you can remain here for questions, I would appreciate it very much.

Thank you.

[recess]

Chairman MOORE OF KANSAS. The committee will be back in session.

I'm going to recognize myself for 5 minutes.

Ms. Williams Brown, thank you for presenting this very helpful report by GAO on leverage. I'm interested in GAO's observations with respect to leverage and international efforts, such as Basel II, to better supervise financial firms.

As Congress finishes up writing financial regulatory reform, what steps should we take to coordinate our efforts with other countries to do two things: first, to better monitor and even understand leverage and risk-taking; and second, to better constrain excessive leverage?

Ms. WILLIAMS BROWN. I think any efforts that we take in the United States, we have to make sure they have a strong international component. I think the crisis made it very clear that the focus, the national focus also had a huge global effort.

So in terms of Basel II, I think the United States has to continue to be very involved in that process, in making sure that we do a true lookback at Basel II to determine if we need to go back and have a fundamental reassessment of the current approach to determining regulatory capital.

There have been efforts in the past several months to deal with certain issues, such as the procyclical nature of capital, and making sure that institutions are building up capital levels during the good times, so they aren't forced to do that in the midst of a crisis.

But there are a number of other efforts that we need to continue to focus on from a global perspective, and Basel II is one place definitely to take a look.

Chairman MOORE OF KANSAS. Thank you.

Professor Acharya, I had one thing that was troubling for our committee and Americans to learn at our recent hearing on the failure of Lehman Brothers, was how they used Repo 105 and other means to hide their excessive leverage.

How concerned are you about debt masking, especially since the SEC depends on quarter-end reporting requirements? Is there a better way to monitor debt and leverage?

Mr. ACHARYA. I think this ought to be one of the most significant concerns, especially if we are talking about regulating leverage, not just the use of Repo 105 by Lehman Brothers. Especially from 2004 until the middle of 2007, there was over $1 trillion of assets parked in what were apparently not balance sheet entities, which had direct connections back to bank balance sheets, but that were never consolidated, either for accounting purposes or for purposes of calculating regulatory capital.

So one of the big messages, I think, from this crisis is that it's not just important to put in place a law with the right intention. I think the enforcement of the law, good enforcement of the law is equally important. And we really have to legislate the shadow banking world, because one of the reasons why the shadow banking world has developed is precisely to get around some of the important leverage and capital regulations.

So I would say two things. Any leverage regulation that does not address the shadow banking world will simply push more leverage into the shadow banking world. And two, the right way to proceed is to legislate transparency so that regulators, on a high-frequency basis, can actually observe the leverage of these institutions, and provide timely aggregated reports to themselves, as well as to market participants.

Chairman MOORE OF KANSAS. Thank you, sir.

Professor Walker, you say in your testimony, "I believe that the TARP commitment was essential," and later say, "Our economy would be rebounding much more slowly than it has if we had not implemented the TARP program."

Of course, a lot of Americans were very upset about TARP, and most of us who voted for it didn't feel good about it when we did it, but we felt we had to. And all the experts who looked at this said we didn't have an option.

Will you elaborate, sir, on how, if TARP was not enacted into law, the situation might have been worse, not just for Wall Street, but for Americans and our constituents back home, if you agree with that?

Mr. DAVID A. WALKER. Yes, I do, Congressman.

And I think that, without TARP, we could easily have had unemployment double the current rates. There have been a few policy pieces written on that, maybe not as analytical as we would all like, but I think there was a real risk.

The other thing was that—and this was sort of my perspective at the time—it was clear that Congress was standing up and tackling this vigorously, and I think that inspired some confidence. I think it may have inspired some confidence in international markets. Yes, we had this crisis, but we weren't going to ignore it, and the Congress was taking the lead.

Chairman MOORE OF KANSAS. Thank you, sir.

My time has expired.

Ms. Biggert, you're recognized for 5 minutes.

Mrs. BIGGERT. Thank you, Mr. Chairman.

In the Wall Street Journal today, there is a Fannie Mae political reckoning article, and I just want to read something from there.

It says: "The Financial Crisis Inquiry Commission spent yesterday focusing on financial leverage, using Bear Stearns as an example, but Fannie and Freddie were twice as leveraged as Bear and much larger as a share of the mortgage market. Fannie and Freddie owned, or guaranteed, $5 trillion in mortgages and mortgage-backed securities when they collapsed in September 2008. Reforming the financial system without fixing Fannie and Freddie is like declaring a war on terror and ignoring Al Qaeda."

And then in the former panel, I asked the other Mr. Walker about how you would—that there were some alarming numbers regarding the Federal debt, especially when you account for the debt owed to Social Security, Medicare, and the total GSE liabilities.

What should be done regarding GSE debt? Can the Federal Government afford to continue writing a blank check to Fannie and Freddie?

Who would like to answer that?

Mr. Geanakoplos?

Mr. GEANAKOPLOS. "Geanakoplos."

Mrs. BIGGERT. "Geanakoplos."

Mr. GEANAKOPLOS. It means "Johnson," in Greek.

Mrs. BIGGERT. Oh, good. You must be Swedish, then. Just kidding.

Mr. GEANAKOPLOS. Yes. We should never have allowed Fannie and Freddie to get so big and so leveraged. The only reason they were able to get so big is, the government implicitly guaranteed their debt, so they would borrow tremendous amounts of money, and investors wouldn't think twice about it, when giving them money, because they figured that the money was good because the government was backing it.

And many people called for regulation of Fannie and Freddie, and called for them to be—for their debt levels to be held lower, and called for them to be smaller, and we ignored those calls. And then, in fact, they did fail, and we are now put in the position of having to honor what was only an implicit guarantee.

So we could, at one point, have—at that point, we could have defaulted on the debt. And a lot of it is held by China, a lot of it is held by American investors. We made a choice not to default, and now we hold the debt.

And as you said, if you put Fannie and Freddie's portfolios together with all the loans they insured and so on, it comes—plus if you put together the other government purchases, like through FHA, you're talking about $6- $8 trillion worth of mortgages that our government—debt offset by mortgages that our government owes.

And the fact is, we're going to—there are going to be a lot of defaults. We might lose almost $1 trillion. There are estimates at $400 billion. It might come to almost a trillion.

I don't know what we can do about it now. We have committed ourselves to back it. Unless we default on it, we're going to lose that money. We just have to prevent ourselves from ever getting in that position again.

Mrs. BIGGERT. Would you agree, then, that the government has to get out of the business of financing or providing guarantees across the entire economy?

Mr. GEANAKOPLOS. The government can never be on the hook for such a tremendous amount of money.

Right now, almost all the mortgage lending is being done by the government. There are hardly any other loans being done by the private sector.

The government has to find a plan of not—the FHA plan is to loan at 3 percent down now. That's again, that out-competes any private lender. So instead of encouraging private lending, they're discouraging private lending.

So I think that we need a different kind of initiative that will foster more private lending instead of government lending.

Mrs. BIGGERT. Thank you.

Then, Mr. Walker, you—given the data that you provided on government debt, which is alarming, would you agree that the government has to get out of the business of financing or providing guarantees across the entire economy?

Mr. DAVID A. WALKER. I don't think we can have the U.S. Government get out of that activity, but I think what we really need to do is to make sure that the public understands, and the markets understand, the various aspects of the debt.

I am guessing, if we did a survey, and let's say we took a survey just of people who have business education degrees, undergraduate and Master's, just that limited group, and we asked them about the role of Fannie and Freddie in terms of the U.S. Government, that most would say they are government agencies.

We have a tremendous job to do in terms of financial literacy in the United States, and it's not just people who have had no training, in terms of understanding risk and leverage and things that this committee is dealing with in these hearings.

Mrs. BIGGERT. So you would call for greater transparency?

Mr. DAVID A. WALKER. Absolutely.

Mrs. BIGGERT. We really have, what, two choices. One is that we would put them on a budget, as a government agency, and be under the controls of salaries and everything else; or, we would just turn them into a private, just a private company, and they would fend for themselves.

Mr. DAVID A. WALKER. Either one of those would be a big improvement from the current environment, and the—I would put it on budget as soon as possible, and then think about gradually privatizing.

I have done a little bit of work in some of Central European countries in terms of privatization, and actually have a paper linking privatization and fiscal deficits. And it turns out that, for the most part, rising privatization needs to accompany larger Federal deficits.

So I'm not sure that would be translatable to industrialized countries, but it is something to be alerted to.

Mrs. BIGGERT. Thank you. My time has expired.

Chairman MOORE OF KANSAS. Mr. Lee, you're recognized for 5 minutes, sir, if you have questions.

Mr. LEE. Thank you very much.

I apologize for my lateness, but I'm glad to have a chance to hear from some of you.

And it's ironic we're talking about deleveraging of the banking institutions, but one of my bigger concerns is the deleveraging of the U.S. Government. Among the lessons that we learned from the financial crisis was certainly the dangers of financial concentrations.

Many institutions relied on particular investors to roll over the loans, and when those investors would not oblige, over the concerns of the leverage of the institutions, as we all know, failures began to result. These institutions were not able to finance through other investors, and began defaulting on their own obligations.

When I see the Administration implementing a policy of borrow-and-spend, I believe there are very scary parallels to this situation.

My background prior to coming here last year was running a manufacturing business, and I know a little bit about leveraging and being able to read a balance sheet. And if you look at our balance sheet, it's a frightening set of circumstances.

Under the President's current budget, we are on plan to borrow 42 cents for every dollar we spend in this country. It is—if this was done in the private sector, I hate to tell you, the company would be out of business.

In just 2 years from now, our national debt will be bigger than the size of our entire U.S. economy. We're talking about close to a $15 trillion deficit. Our debt to GDP ratio would be at over 100 percent. And what people forget is, Greece is at 125 percent. We're not far behind.

Getting to my point here, the Chinese hold a huge amount of our government debt, I believe in total, in aggregate, of roughly 7 percent. My concern is, when they decide to stop financing our spending, what ultimately could happen is the same thing that we're seeing in some of our financial institutions. The United States is going to have to search out for other investors.

Ultimately, what we will see are higher interest rates, and we're looking at—when you're looking at a deficit this high, the interest payment alone will typically exceed what we're paying out, for example, in Social Security, or what we're doing with our national—with our defense.

We have a policy here that the Administration is really, in my opinion, shying away from, and we have to get our fiscal house in order.

Maybe I can start with Mr. Walker. Your concerns—do you agree that this is a real possibility with how leveraged the U.S. Government is?

Mr. DAVID A. WALKER. Everything I know about—the numbers that you have posed are very accurate.

I was surprised to hear you say the 7 percent. I thought the number was larger than that, but it may depend on calculations, for China.

I am very concerned about the rise in interest rates, and I cite in my testimony, in the submitted testimony, work of the budget director previously writing about fiscal deficits causing rising interest rates. So I agree with you.

But I don't think we had a choice. I think—

Mr. LEE. If you were an auditor on safety and soundness, and you were auditing our books, would you shut us down?

Mr. DAVID A. WALKER. No, I wouldn't shut us down. I would say, as the Comptroller General, former Comptroller General David Walker, has written extensively, that we need to make some dramatic changes.

One of the things I have heard him say in other presentations was that we need to index the age at which people collect Social Security. When we started Social Security originally, we said people can collect at age 65, and the expectation was that you would live 7 years, maybe 9 years.

Now, the expectation is, you begin collecting Social Security, at age 65, and you could well be collecting it for 25 years.

So I think, if I were the auditor—and I don't have that training in accounting—I would say, "Look, we need to go back and make a lot of changes in how we're committing."

Mr. LEE. Does anybody else want to comment?

Mr. ACHARYA. Yes. I just wanted to note something that President Hoenig actually mentioned earlier in the day, which is that the real danger we face is that the pattern of capital flows, in this case, money coming from China, is such that it remains very stable for long periods of time, and, boom, one day it will just start reversing itself.

So—

Mr. LEE. If that were to occur, what impact would you expect if that happened?

Mr. ACHARYA. My sense is that it's kind of too late to do much at that point. I think—

Mr. LEE. If China stopped buying our debt, what would you think the short-term impact would be?

Mr. ACHARYA. I think the short-term impact would be a substantial rise in the borrowing costs, compared to what we have.

There's a sense in which the flood of Chinese money coming in is a mixed blessing, which is that it's sort of masking, actually, the "true" cost of our borrowing.

Mr. LEE. It's much like the housing market. When we had the bubble, nobody wanted to end the parade, and now we have China coming in buying our debt, and again, it's giving us an excuse not to make some hard decisions in this country.

Mr. ACHARYA. Absolutely.

Mr. LEE. With that, I appreciate your comments, and I'll yield back.

Chairman MOORE OF KANSAS. Thank you, sir.

We're going to do a second round of questions, if that's all right.

Professor Geanakoplos, you make some suggestions that, instead of monitoring leverage on a firm-by-firm basis, especially if those firms have an incentive to use off-balance-sheet instruments to hide their true leverage and risk-taking, that we should monitor leverage on a transaction-by-transaction basis, looking at how much downpayment was used to purchase a security.

Would you please, sir, explain how this might help us better constrain excessive leverage?

Mr. GEANAKOPLOS. Thank you for the question. You have put it exactly the way I intended it.

Everybody who borrows money, practically, has to put up collateral, so if you monitor things transaction-by-transaction, you get all the transactions. So you'll find out not just about a few banks, how leveraged they are. You'll find out something about the entire system. That's number one.

Number two, the transaction's, I call it security leverage, the downpayment, is an accurate indicator of where the economy is going.

If you do investor leverage, you often get the opposite number. So take a problem where the—like we had recently. The market is going down, nobody is able to borrow, precisely because they have to put up too much collateral.

So the actual leverage is going down in the system, but if you look at one of our big banks, their leverage is going up, most of those institutions, because they're Lehman or Bear Stearns, just before they go out of business, they're running out of equity, and it looks like their leverage is skyrocketing.

If you measure investor leverage, you're often going to get precisely the wrong number, so just at the moment when there's a crisis, and if anything you should be loosening leverage, their leverage looks like it's getting tighter, and the regulator might be led to do the exact wrong thing.

Third, as you said, you can hide your leverage, if you're an institution. You put things off-balance-sheet, you can do all kinds of tricks. But if you're talking about an actual transaction, the lender is going to want protection, so there's going to be real collateral there, and you'll know how much it is. You also have two people telling you what the leverage is.

So for all those reasons—oh, and then lastly, if you try to set a 15 percent rule, I think this could be quite dangerous. If you set a 15 percent rule for a select few institutions, the leverage will move. You'll have a huge incentive to move the leverage somewhere else, and you'll never be able to catch up to it. But if you're looking at it, security-by-security, it has to be there. It's something measurable.

So I think everyone would agree that transparency is tremendously important. The numbers that should be published every month are averages of the security leverage numbers, so the average downpayment on a house, the average downpayment on a mortgage security if you buy it.

And those numbers, if they appeared in newspapers, and generally speaking, people would have a much more accurate picture of what was going on in the economy, and the regulator would have pressure from the public, actually, to do the right thing, because everybody would know where we are.

But if you just measure a few institutions, that leverage is going up and down in the wrong direction part of the time, depending on their profitability, and not on what the borrowing conditions really are.

Chairman MOORE OF KANSAS. Thank you.

Does anybody else have a comment on this? Ms. Williams Brown?

Ms. WILLIAMS BROWN. I would like to comment on this.

The Systemic Risk Council concept continues to be very much individual institution focused, but if the council is really to function effectively, it needs to be able to look for risk throughout the system, and this offers an interesting way to begin to try to peel that onion of looking at and identifying risk that may be building up in the system, that poses a systemic risk. So I think it's an interesting idea.

Chairman MOORE OF KANSAS. Mr. Acharya?

Mr. ACHARYA. I would just like to add one institution that is being discussed, which could serve a very big role here—the Office of Financial Research. I think its goal should be exactly what John has described, which is to record the financial transactions which are taking place, be it issuing a new debt out there, doing a derivatives transaction.

And the most important thing is that some of this information is being recorded right now, but no one is actually recording how much up-front payment or collateral is actually being put up when the transaction is being done.

Even in our derivative contract records, we don't have this information right now, so we are relying on markets' ability to discipline each other, but that's leaving a lot to the market.

Mr. GEANAKOPLOS. Could I add one more thought on that?

Chairman MOORE OF KANSAS. Yes, sir.

Mr. GEANAKOPLOS. I would just re-emphasize that point.

So one of the ways of leveraging the system is using derivatives, but this—and people say it's very hard, how to keep track of leverage, when there are all these derivatives and things.

But actually, this transaction-by-transaction approach works there, too, because if you write a CDS insurance contract saying you'll pay if the bond defaults, you have to put up collateral for that, too. So we know how much collateral is being put up for that, as well. So you'll cover the derivatives case, as well as leverage moving around, and many—it's a principled way of getting at the problem.

Chairman MOORE OF KANSAS. Thank you.

My time has expired.

Ms. Biggert, do you have questions?

Mrs. BIGGERT. Thank you, Mr. Chairman.

Ms. Williams Brown, thank you for talking about the risk, as such. I hope that you would take a look at H.R. 3310, the Republican bill, which really addresses that issue.

In your study of leverage, did the GAO review the current status of the balance sheets of the GSEs, Fannie and Freddie?

Ms. WILLIAMS BROWN. We did not include them.

Mrs. BIGGERT. Can you do that?

Ms. WILLIAMS BROWN. Yes.

Mrs. BIGGERT. Yes. Since Fannie and Freddie were leveraged twice as much as Bear Stearns, does the GAO plan to examine why the GSEs were leveraged to such extremes?

Ms. WILLIAMS BROWN. We currently don't have plans, and we haven't been asked to do that, but if we were asked to do that, we would.

Mrs. BIGGERT. Okay. Is that because it's—there's no reason, it's just you haven't been asked?

Ms. WILLIAMS BROWN. Correct.

Mrs. BIGGERT. Okay. Would this fall within the mandate to examine leverage in ESA?

Ms. WILLIAMS BROWN. It's something that we could have expanded the scope to do, but on this particular mandate, we were given a fairly short window to do the work, so we did not specifically include Freddie and Fannie in our study at the time.

Mrs. BIGGERT. Could I ask you to do that?

Ms. WILLIAMS BROWN. Yes.

Mrs. BIGGERT. Or, I ask you to do that.

Ms. WILLIAMS BROWN. Okay.

Mrs. BIGGERT. Professor Walker, you mentioned that larger institutions are riskier than smaller institutions based on a non-deposit liability to Tier 1 capital ratio.

Is that higher risk, level of risk due to the "too-big-to-fail" status, or is there another issue there?

Mr. DAVID A. WALKER. I didn't do calculations that I guess would direct me immediately to "too-big-to-fail," and I think that, when we go through and look at individual institutions, of the large ones, we see some that, where this would surely be a problem, and others not. So I think we would have to take it one at a time.

The ratio that I used struck me as a way of getting at the pieces of the leverage and liabilities of institutions that were not deposits, and I'm not assuming all those deposits are insured, but they are different from the other aspects of the liabilities, and I wanted to get a handle on that.

I should also mention, and there's a table in my testimony showing this, that I broke large and small at $1 billion in assets, and with more time, I would take that apart and do considerably finer lines, to try to narrow down sort of where the break point would be.

I'm guessing that it would be $10 billion or maybe even $25 billion, where you would see the higher risk.

Mrs. BIGGERT. With that, I yield back.

Chairman MOORE OF KANSAS. Thank you, Ms. Biggert, and thank you to our witnesses.

I want to thank all of the witnesses for your testimony today. Today's hearing was helpful to further explore these important issues of debt and leverage, giving us a better sense of how we need to use them for responsible purposes, and not get carried away, putting our financial system and economy at risk.

At future hearings in this series this summer, we'll be exploring the importance of risk management, better understanding short-term markets like the repo market, financial literacy, and other key issues.

I ask unanimous consent that the following items be entered into the record: the McKenzie Global Institute's Report on Debt and Deleveraging; GAO and CIS reports on leverage; a paper on growth and debt by Professors Reinhart and Rogarth; and a paper on liquidity and leverage by Adrian and Chen.

The Chair notes that some members may have additional questions for our witnesses, which they may wish to submit in writing. Without objection, the hearing record will remain open for 30 days for members to submit written questions to our witnesses and to place their responses in the record.

This hearing is adjourned, and again, I thank our witnesses for appearing and testifying today.

[Whereupon, at 12:47 p.m., the hearing was adjourned.]

APPENDIX

May 6, 2010

Opening Statement from Chairman Dennis Moore (KS-03)
House Financial Services Oversight and Investigations Subcommittee
"The End of Excess (Part One): Reversing Our Addiction to Debt and Leverage"
May 6, 2010

The strength of our financial system and economy depends on the responsible use of credit and debt, built on trust between the lender and borrower that payment will be made in the future. The word "credit" is derived from the Latin word "credo", which simply means "I believe." While the financial industry complains about a lack of certainty as Congress debates financial reg reform, there is a more fundamental lack of trust that the American people now have in our financial system. To correct these two problems - this lack of certainty and understandable lack of trust - we must enact strong rules of the road this year so the credibility of our financial system can be restored.

A new law, unfortunately, cannot heal our broken financial system alone. The financial industry must take their own steps to restore faith in their business. They must provide services their customers really want, and not use hidden fees or balance sheet tricks to cheat their way to the top again. We need to empower consumers and investors to make better financial decisions. Government must do its part in setting a good example, providing efficient financial oversight with limited resources, and getting on a path to balance the federal budget so we are not passing a massive debt to our children and grandchildren.

In 1978, our combined outstanding debt across the economy – including financial firms, other businesses, households and local, state and federal government debt – was $3.6 trillion, or 157 percent of GDP. By the end of last year, that number ballooned to $50.3 trillion, or 353 percent of GDP. This is the highest level of combined debt in the U.S. on record. Since 1978, our economy is over 6 times larger than what it was as we've grown on average $404 billion each year.

But over the same timeframe, our combined debt has grown nearly 4 times as fast, adding nearly $1.6 trillion each year, on average. Even more troubling is the rapid growth of financial sector debt, as it grew over 41 times larger than what it was in 1978. As GAO noted in its leverage study we will hear about today, Wall Street investment banks had leverage ratios of over 30-to-1 compared to the largest commercial banks, which averaged leverage of 13-to-1. In good times, this means their profits were supercharged, but when asset prices fall, excessive leverage accelerates a firm's failure, as we saw with Bear Stearns and Lehman.

Are we addicted to debt and leverage? I'm afraid we might be, and unless we take bold steps on both financial regulatory reform and budget reform soon, it will be much more difficult to reverse this troubling trend.

When I came to Congress in 1999, it was the last two years of the Clinton Administration and we had budget surpluses for those two years, the first government surpluses in decades. When President Clinton left office, the national debt stood at $5.73 trillion. Unfortunately, the next eight years our national debt grew at a record pace, nearly doubling and hitting $10.7 trillion. Our economy was on the verge of going off the cliff as we were still reeling from TARP and the financial panic in late 2008, and our economy was losing 750,000 jobs a month in early 2009.

Experts and economists from the left and right -- including John McCain's economic advisor, Mark Zandi -- implored Congress to act with a large stimulus to stabilize the economy. So even though it was unpopular, the government responded by enacting the Recovery Act. And TARP was used to implement the Financial Stability Plan. What happened next? The economy stabilized, and slowly but surely we are back on track with real economic growth. Our Republican witness, Professor David A. Walker, agrees in his testimony, writing "our economy would be rebounding much more slowly than it has if we had not implemented the TARP program."

Congress has made strong budget reforms, passing the largest deficit reducing legislation since 1993 in the new health care law. We've re-implemented statutory PAYGO, and the President established a Fiscal Responsibility Commission with a report due at year's end.

I look forward to hearing from our witnesses on these issues today, bringing their experience and expertise on these matters so we can better understand how debt and leverage impacts every American, and what other steps Congress can take to get us back to a more stable path of economic growth.

TESTIMONY FOR UNITED STATES HOUSE OF REPRESENTATIVES

COMMITTEE ON FINANCIAL SERVICES

SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS

FOR THE HEARING

"THE END OF EXCESS (PART ONE): REVERSING OUR ADDICTION TO DEBT AND LEVERAGE"

May 6, 2010

VIRAL V ACHARYA

PROFESSOR OF FINANCE, STERN SCHOOL OF BUSINESS, NYU

HOW BANKS PLAYED THE LEVERAGE GAME AND WHAT CAN BE DONE ABOUT IT

"Good morning, Mr. Chairman and members of the Subcommittee. My name is Viral Acharya. I am a Professor at the Leonard Stern School of Business at New York University. I have worked extensively in the area of systemic risk of financial institutions and its prudential regulation. Along with my colleagues at the Stern School of Business, I have co-edited two books[1] and co-authored several research papers (cited below) that help understand how the financial sector played the leverage "game" in the build-up to this crisis and what can be done about it in future. Much of what I say below is based on this research. Importantly, it has implications also for leverage of the household sector, corporations and the government.

1. Leverage represents the oldest mode of doing financial transactions. It is natural for a lender, wary of what the borrower might do with the funds, to demand a flat repayment. Then, in the event of borrower's default, the lender forces a repayment, for instance, by liquidating the borrower's collateral. This way, leverage allows finance to take place in quantities that are far greater than what could be intermediated in other modes, say equity financing, wherein the financier is exposed to the full risk of activities that the borrower undertakes and has relatively weak rights to force a repayment. Unsurprisingly, lending institutions – most notably, banks – have over time been at the forefront of contributing to finance and economic growth.
2. And yet, we seem to witness, on a somewhat regular basis, episodes during which the financial intermediaries are all over-extending credit, are themselves funded with excess leverage, and when the economic cycle turns downward, fail in a wholesale manner, necessitating government interventions to ensure the orderly functioning of markets and of the real

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[1] Acharya and Richardson (2009) and Acharya, Cooley, Richardson and Walter (2010b).

economy. While leverage has its bright side in expanding finance for the real economy, its dark side is precisely the boom and bust cycle it appears to bring with it. Unfortunately, this dark side of leverage has become enduring as with each cycle comes in place government intervention, accordance of explicit guarantees (such as deposit insurance) and implicit guarantees (such as "too big to fail" and "too systemic to fail"), and the resulting moral hazard from banks effectively lending with "other people's money".

3. One of the most salient such episode was the period of 2004-2Q 2007 during which the financial sector in the United States, and in most parts of the Western world, had grown its balance-sheet at an unprecedented speed and done so mainly through leverage, rather than equity ("capital"). Given its scale, the bursting of this leverage boom since 3Q 2007 has proved to be particularly costly. To many observers, this episode has been surprising given that propensity of the financial sector to lever up at the expense of taxpayers has been well-recognized for some time. Indeed, financial regulation was put in place over the past two decades, in the form of the Basel capital requirements, with the overall purpose of guarding financial stability against the moral hazard of banks taking on excessive leverage and risks.[2]

4. ***There were three primary failures that led to the leverage boom in spite of bank capital regulation. These were (i) mis-priced government guarantees to large parts of the financial sector; (ii) ineffective enforcement that allowed capital regulation to be "arbitraged" by a sophisticated financial sector; and, (iii) in some cases, just poor design of regulation.*** Broadly speaking, the end effect of these failures was that large, complex financial institutions (LCFI's) that were too big and too systemic to fail were operating at reported and regulatory leverage that was far below their true leverage (which for many institutions reached a pre-crisis high of 25:1, in other words, 24 dollars of leverage on a 25 dollar balance-sheet). Specifically,

    - Commercial banks (the world over) exploited loopholes in the Basel capital regulation to park illiquid loans and mortgage-backed securities (MBS) in off-balance sheet entities that were financed with close to 100% leverage. The off-balance sheet entities had direct recourse to the sponsor banks' balance sheets in case loans and MBS went bad. More than 90% of the commercial banks did not pay any fee between 1997 and 2006 for issuing deposits with federal deposit insurance.[3]

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[2] Acharya, Cooley, Richardson and Walter (2010a) provide a much longer historical context of this view, explaining how the Banking Act of 1934 in the United States prudently combined the creation of the Federal Deposit Insurance with investment restrictions on commercial banks via the Glass-Steagall Act. Over time, however, the Glass-Steagall Act was informally, and eventually formally, repealed. One advantage of the proposed "Volcker rule" that recommends separation of proprietary trading from other banking activities is to ensure that access to government-insured deposits does not fund highly cyclical and speculative trading activities.

[3] See Acharya, Schnabl and Suarez (2009) for a detailed description of the "regulatory arbitrage" involved in setting up of these off-balance sheet entities (asset-backed commercial paper – ABCP – conduits). Authors refer to these

- Investment banks – the so-called "broker dealers" of the United States – were allowed to employ internal risk-assessment models that essentially ignored any downside risks. This way they managed to hold more and more of sub-prime linked MBS, financed almost entirely with overnight debt.
- Government-sponsored enterprises (GSEs) in the United States – Fannie and Freddie, in particular, joined the fray too, raising leverage with the implicit government guarantee but without paying for the guarantee, and engaging in hedge-fund style purchases of illiquid, sub-prime backed MBS.
- A traditional insurance firm in the United States sold guarantees on the risk of default on loans and mortgages made in most parts of the world (and their re-packaged versions), but kept aside relatively little in terms of reserves or liquidity. This was achieved by picking its own regulator to ensure it could remain weakly capitalized even while guaranteeing over half a trillion of notional amount of credit risk.

Much of this leverage growth happened in the "shadow banking world", the less-regulated (or un-regulated) part of the financial sector consisting of off-balance sheet entities, repurchase agreements between financial institutions and over-the-counter (OTC) derivatives. Also, for most part, the leverage was extremely short-term in nature, to be rolled over at overnight or weekly frequencies. Such levels and forms of leverage exposed the financial system to great risk from a secular economic downturn and reduction in the ability to continue borrowing, especially because the leverage had been used to finance and hold risky and illiquid MBS, much backed by sub-prime loans, whose values fell dramatically with the downturn.[4]

5. Thus, facilitated by access to explicit or implicit government guarantees in raising leverage and unconstrained by weak or poorly designed capital requirements, LCFI's took a cheaply-financed, massive one-way bet on the economy, what my colleagues and I call "manufacturing tail risk".[5] The willingness of the LCFI's to take on such tail risk, in turn, allowed mortgage originators to make bad loans and simply pass them down the chain to LCFI's, who together held over 50% of the AAA-rated tranches of sub-prime MBS, securities that would be super-safe only if there was not a secular downturn in house prices. As a result, when this tail risk materialized in 3Q 2007, the balance sheets of these institutions were so heavily leveraged, so illiquid, and so large (11 financial firms controlling over 60% of economy's assets) that in most cases, the government or the Federal Reserve had to backstop some or all of the losses.

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entities as a form of "securitization without risk transfer". Effectively, commercial banks had employed securitization to concentrate rather than disperse risks from their balance sheets.

[4] Adrian et al (2010) document that shadow banking assets grew from an amount close to zero in 1980 to somewhere between $15 to $20 trillion by 2008.

[5] Acharya, Cooley, Richardson and Walter (2010a).

6. What can be done about this leverage game and the attendant boom and bust cycle? It is clearly important to limit the contingencies under which government guarantees have to be accorded to the financial sector. This requires improving the ability of regulators to wind down LCFI's when they get into trouble.[6] In interest of time and space, however, I focus here only on those regulatory options that deal directly with leverage growth in good times. A key lesson is that financial sector regulation needs to take on a macro-prudential role, and not just a micro-prudential one: Simply ensuring the safety of each individual bank is not sufficient to ensure stability of the financial system. Banks may seem safe individually but be perfectly correlated, e.g., all bet on the housing market. To address this, ***supervision conducted by the regulators (the Federal Reserve and/or the proposed Financial Stability Oversight Council), should examine leverage and asset exposures of the financial sector as a whole.***

7. Two important steps in this direction would be the following:

    - ***Current Basel capital regulation does not take any account of the liability structure of a financial firm's balance-sheet. This is a major shortcoming that should be addressed.*** There are three ways to proceed:

        - *Tax leverage*: This would be akin to one of the levies recently proposed by the International Monetary Fund. By itself, it reduces (or eliminates) the corporate tax deductions given to the taxed part of leverage. Its significant weakness is that it takes no account of differences in asset holdings of financial institutions and may in fact constrain certain types of financial intermediation.

        - *Introduce leverage caps*: This approach seems somewhat more prudent and has been successfully adopted by other countries, most notably Canada. Even at the worst point of the crisis, stable banks such as JPMorgan Chase and HSBC had assets to equity ratios that did not exceed 15:1. A leverage cap to not exceed such a limit also has the advantage of being simple to harmonize internationally.

        - *Combine leverage information in supervisory stress tests*: The Federal Reserve System is considering whether to perform on an ongoing basis a supervisory "stress test" (similar to the one it conducted in Spring 2009) with the objective of ensuring that systemically important financial institutions have sufficient capital buffers to withstand losses in extreme economy- and market-wide scenarios. Such a test could also take account of short-term, rollover nature of liabilities of these institutions, and with better transparency, also include contingent liabilities through derivative contracts.

    - ***The regulation of the "shadow banking world" needs to be brought in synchronization with the on-balance sheet regulation of financial firms.*** This is because banks may be arbitraging limits of capital regulation and supervision so that leverage and risks show up in the shadow banking world rather than on bank balance-sheets. Further, any attempt to regulate leverage that ignores the shadow banking world would only lead to even more growth in regulatory arbitrage activity and off-balance sheet leverage. Avoiding this requires regulation to expand its scope to off-balance sheet entities, money market funds, repurchase agreements, and derivatives that remain over-the-counter even after proposed migration to centralized clearinghouses. At the least, greater transparency of the shadow banking world needs to be legislated so that regulators have timely information to understand the full risk and leverage exposure of regulated entities. Some timely disclosures of aggregated risk and leverage reports can also help strengthen market discipline that financial firms impose on each other.

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[6] The full range of available options is discussed in Acharya, Cooley, Richardson and Walter (2010b).

8. It would be inaccurate, however, to put all blame of the crisis on the financial sector. While the financial sector offered, households stood ready to take on leverage, not just to own houses but also to consume. Indeed, the ratio of household debt to home values in the United States stood at a staggering 89% in 2008 compared to just 68% in 2005, and 56% twenty years earlier, in 1985. However, losing control of the financial sector's leverage ruled out a potentially effective tool that regulators had to protect the economy from the household urge to borrow.

9. Interestingly, ***while there is hope that better regulation of the financial sector can constrain household (and corporate) leverage, there is less of such hope with regard to constraining the growing leverage of the government balance-sheet.*** The ratio of government debt to GDP in the United States is now approaching 100% (and by some other measures, close to 120%, its level in 1945 following the World War II). The steady rise in government debt to GDP ratio since 2001 (when it was under 40%) is an alarm for concern as the economy's recovery remains practically jobless, house prices stagnant, and global economy fragile. Any further rise in federal leverage is unlikely to be sustainable in wake of a significant global shock (such as further weakening of sovereigns in the Euro-zone or slowdown of economic growth in Asia). There are at least three responses that warrant consideration.

    - First, as a part of its stimulus, government has provided a non-trivial quantity of guarantees to the financial sector and the GSEs. Fiscal planning should take account of these guarantees and recognize that government's contingent leverage is significantly higher than its current leverage. Wherever possible, the government should plan for a graceful exit from the guarantees.

    - Second, the GSE's have out-lived their original purpose and in search of a new business model starting 2004, have imposed a huge cost on the taxpayers at large. There is no certainty that this won't happen again. Indeed, the reform of the GSE's has been excluded in proposals being discussed for financial sector regulation. The mandate of GSE's should be restricted right away to the original objective of guaranteeing only the highest-quality mortgages. Their hedge-fund style functions should be disbanded altogether. This would be like "tying Odyseeus to the mast" so that we do not give in to the "call of the sirens", in this case, the American dream of universal home ownership, which has by most indications also out-lived its utility at this stage of growth and development of the United States.

- While the status of the United States Dollar as the reserve currency ensures that capital flows into the United States facilitate the fiscal stimulus of the economy, this status and inflows should not be taken for granted. If the government balance-sheet looks increasingly leveraged to the rest of the world in future, as did the financial sector's balance-sheet starting the second half of 2007, there is the risk of significant reversal of capital flows and pressure on ability to borrow any further except at elevated costs. Fiscal restraint may now be necessary, even if that entails a somewhat slower recovery.

10. In Conclusion, the most recent leverage-fueled boom and bust cycle can be traced at its roots in government guarantees and ineffective capital regulation of the financial sector. The cycle ensnared most of the financial and the household sector, put at risk the corporate sector, and exposed the indebtedness of the government balance sheets worldwide, and in particular, also in the United States. The desired prudential response now – from households, corporations, financial firms, and the government – is the same as what is always necessary to avoid a costly leverage cycle: to save for a rainy day!"

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"The End of Excess (Part One): Reversing Our Addiction to Debt and Leverage"

May 6, 2010

Appendix

1. **"Securitization without Risk Transfer"** by Viral V. Acharya, Philip Schnabl, and Gustavo Suarez (First Draft: March 1, 2009; This Draft: April 15, 2010; 68 pages)

2. **"Manufacturing Tail Risk: A Perspective on the Financial Crisis of 2007-09"** by Viral V. Acharya, Thomas Cooley, Matthew Richardson, and Ingo Walter (*Forthcoming, Foundations and Trends in Finance*, volume 4, 2010; 85 pages)

3. **Acharya Resume** (10 pages)

Securitization Without Risk Transfer[1]

Viral V. Acharya[2], Philipp Schnabl[3], and Gustavo Suarez[4]

First draft: March 1, 2009

This draft: April 15, 2010

Abstract

We analyze asset-backed commercial paper conduits which played a central role in the early phase of the financial crisis of 2007-09. We document that commercial banks set up conduits to securitize assets worth $1.3 trillion while insuring the newly securitized assets using guarantees. The guarantees were structured to reduce bank capital requirements, while providing recourse to bank balance sheets for outside investors. Consistent with such recourse, we find that during the first year of the crisis, asset-backed commercial paper issuance fell and spreads increased, especially for conduits with weaker guarantees, riskier banks, and lower quality assets; that banks with more exposure to conduits had lower stock returns; and that losses from conduits remained with banks rather than outside investors. These results suggest that banks used this form of securitization to concentrate, rather than disperse, financial risks in the banking sector while reducing their capital requirements.

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Securitization was traditionally meant to transfer risks from the banking sector to outside investors and thereby disperse financial risks across the economy. Since the risks were meant to be transferred, securitization allowed banks to reduce regulatory capital, except on pieces they retained, typically the first-loss piece in order to ensure they had some "skin in the game". However, in the period leading up to the financial crisis of 2007-09, banks increasingly devised securitization methods that allowed them to concentrate risks on their balance sheets, and yet did not hold much capital against these risks, a practice which eventually led to the largest banking crisis since the Great Depression. In this paper, we analyze one form of securitization, namely asset-backed commercial paper conduits (henceforth, conduits), as an example of how banks exposed themselves to such under-capitalized risks.

Conduits are special purpose vehicles set up primarily by large commercial banks. Conduits exhibit a significant maturity mismatch between assets and liabilities as they mostly hold medium- to long-term assets, which are financed by issuing short-term asset-backed commercial paper. Conduits are thus similar to regular banks in many ways and form an integral part of financial intermediation that has over time come to be called "shadow banking". Put simply, shadow banking is that part of the intermediation sector that performs several functions that we traditionally associate with commercial and investment banks, but which runs in the "shadow" of the regulated banks in that it is off-balance sheet and less regulated.[5] As shown in Figure 1, before the financial crisis, asset-backed commercial paper grew from US$650 billion in January 2004 to US$1.3 trillion in July 2007. At that time, asset-backed commercial paper was the largest short-term debt instrument in the United States. For comparison, the second largest instrument was Treasury Bills with about $940 billion outstanding. However, the rise in asset-backed commercial paper came to an abrupt end in August 2007.

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[5] Adrian et al (2010) document that shadow banking assets grew from an amount close to zero in 1980 to somewhere between $15 to $20 trillion by 2008. In 2007, conduits represented about 25% of total assets newly transported to shadow banking. In terms of the stock of assets, as of July 2007, conduits held over $1.2 trillion, compared to securities lending of $0.6 trillion, broker-dealer repo of $2.5 trillion, and financial commercial paper of $0.8 trillion.

On August 9, 2007, the French bank BNP Paribas halted withdrawals from three funds invested in mortgage-backed securities and suspended calculation of net asset values. Even though defaults on mortgages had been rising throughout 2007, the suspension of withdrawals had a profound effect on the asset-backed commercial paper market.[6] As shown in Figure 2, the interest rate spread of overnight asset-backed commercial paper over the Federal Funds rate increased from 10 basis points to 150 basis points within one day of the announcement. Subsequently, the market experienced the modern-day equivalent of a bank run and asset-backed commercial paper outstanding dropped from $1.3 trillion in August 2007 to $833 billion in December 2007. Apparently investors in asset-backed commercial paper, primarily money market funds, became concerned about the credit quality and liquidation values of collateral backing asset-backed commercial paper and stopped refinancing the maturing asset-backed commercial paper.

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[6] The announcement read: "[T]he complete evaporation of liquidity in certain market segments of the US securitization market has made it impossible to value certain assets fairly regardless of their quality or credit rating [...] Asset-backed securities, mortgage loans, especially subprime loans, don't have any buyers [...] Traders are reluctant to bid on securities backed by risky mortgages because they are difficult to sell [...] The situation is such that it is no longer possible to value fairly the underlying US ABS assets in the three above-mentioned funds." (Source: "BNP Paribas Freezes Funds as Loan Losses Roil Markets," Bloomberg.com, August 9, 2008).

Our main conclusion in this paper is that, somewhat surprisingly, this crisis in the asset-backed commercial paper market did not result (for the most part) in losses being transferred to outside investors in asset-backed commercial paper. Instead, the crisis had a profoundly negative effect on commercial banks because banks had insured outside investors in asset-backed commercial paper by providing guarantees to conduits, which required banks to pay off maturing asset-backed commercial paper at par. Effectively banks had used conduits to securitize assets without transferring the risks to outside investors.

We establish this finding of securitization *without* risk transfer using a hand-collected panel dataset on the universe of conduits from January 2001 to December 2009. We document and describe the structure of the guarantees that effectively created recourse from conduits back to bank balance sheets. These guarantees were explicit legal commitments to repurchase maturing asset-backed commercial paper in case conduits could not roll their paper, not a voluntary form of implicit recourse.[7] The guarantees were mostly structured as "liquidity enhancements", a design that would reduce their regulatory capital requirements to at most a tenth of capital required to hold for on-balance sheet assets. For the majority of conduits, the guarantees were structured to cover the assets' credit and liquidity risks and absorb all possible losses of outside investors. Hence, this form of securitization practically retained the risks of the securitized assets with banks rather than outside investors. For a minority of conduits, the guarantees did not cover all of the assets' liquidity and credit risks and required banks to cover only a share of the losses.

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[7] However, there was some scope for implicit recourse in the case of weaker credit guarantees.

Consistent with the motive for setting up conduits being one of regulatory arbitrage, we find that most guarantees were structured as liquidity enhancements. We show that sponsoring institutions other than commercial banks (which among financial institutions are subject to the most stringent capital requirements) were far less likely to use such structures. Also, we note that the growth of asset-backed commercial paper stalled in 2001 after U.S. bank regulators discussed an increase in capital requirements for conduit guarantees (following the failure of Enron which had employed conduit-style structures to create off balance-sheet leverage) and picked up again after regulators decided against the increase in 2004. We also note that banks based in countries such as Spain and Portugal that do not allow such regulatory arbitrage do not sponsor conduits.

Next, we examine the effect of guarantees on the conduit's ability to roll over maturing asset-backed commercial paper. We use a novel conduit-level data set to study daily issuances and spreads of asset-backed commercial paper both before and after the start of the financial crisis. We show that starting August 9, 2007, conduits experienced substantial widening of spreads and a decline in asset-backed commercial paper outstanding (or in other words, a decrease in their ability to roll over maturing asset backed commercial paper). We show that conduits with weaker guarantees had a larger decline in outstandings and a larger increase in spreads after the start of the financial crisis. The result is robust to controlling for observable asset categories, which suggest that the strength of the guarantee does not simply proxy for the quality of conduit assets. We further find that the results are stronger for riskier banks (as measured by credit default swap spreads). These results suggest that the lack of risk transfer, as measured by the strength of guarantees, is central to conduits' ability to roll-over asset-backed commercial paper after the start the financial crisis.

We then examine the extent of realized risk transfer by analyzing whether investors could rely on the guarantees offered by financial institutions during the crisis. We take the perspective of an investor that was holding asset-backed commercial paper at the start of the crisis and examine whether the investor suffered losses by not refinancing maturing asset-backed commercial paper. Using announcement data from Moody's Investors Services, we identify all conduits that defaulted on asset-backed commercial paper in the period from January 2007 to December 2008. We find that all outside investors covered by strong guarantees were repaid in full. We find that investors in conduits with weak guarantees suffered small losses. In total, only 2.5% of asset-backed commercial paper outstanding as of July 2007 entered default in the period from July 2007 to December 2008. Hence, about 97.5% of losses on conduit assets remained with sponsoring banks. Assuming loss rates of 5% to 15%, we estimate that commercial banks suffered losses of $68 billion to $204 billion on conduit assets.

Lastly, we examine the impact of conduit exposure on bank stock returns. To identify the impact of conduit exposure separately from other bank observables, we focus on a narrow event window around the start of the financial crisis on August 9, 2007. An increase in conduit exposure (measured as the ratio of asset-backed commercial paper to bank equity) from 0% to 100% (e.g., Wells Fargo to Citibank) reduced stock returns by 1.5 percentage points in a three-day window around the start of the financial crisis. The effect of conduit exposure on stock returns increases to 2.9 percentage points when we expand the event-window to one month. The result is robust to using alternative measures of conduit exposure and controlling for a large set of observable bank characteristics.

We note that the lack of ex-post risk transfer to conduit investors coupled with the ex-ante structure of guarantees that allowed close to zero capital requirements is highly suggestive of leverage-seeking or capital-reducing incentives on parts of commercial banks. Equally important, the lack of risk transfer suggests that any explanation of the financial crisis must explain why banks chose to concentrate under-capitalized risks in this manner. In particular, it is not sufficient, and in fact is likely inadequate, to simply assert that banks created "safe" assets, which were sold to uninformed outside investors, and that these assets turned out to be risky.

We emphasize that all of our evidence on the performance and effects of conduits is necessarily ex post. It is possible that ex ante it was efficient for individual banks to build up leveraged exposures through conduits. It is equally possible that ex ante the risks of guarantees were ignored by bank management due to poor risk management that did not keep pace with that of financial engineering, or ineffective corporate governance, or simply short-termism – phenomena that may have been the result of deeper underlying causes such as increased competition in banking activities, resulting erosion of margins and franchise values, and the moral hazard due to government guarantees such as deposit insurance and the too-big-to-fail doctrine. Investigating these underlying causes is an important question for future work.

The remainder of this paper is organized as follows. Section 1 presents the related literature. Section 2 discusses the institutional background. Section 3 provides our theoretical framework. Section 4 presents the data and discusses our empirical results. Section 5 analyzes the incentives of banks to set up conduits. Section 6 concludes.

1. Related literature

Gorton and Souleles (2005), Gorton (2008), Brunnermeier (2009), and Kacperczyk and Schnabl (2009) provide examples of maturity transformation outside the regulated banking sector. Our focus, in contrast to theirs, is to provide an in-depth analysis of the structure of asset-backed commercial paper conduits: how risk transfer was designed to take place through conduits and how it materialized and contributed to the start of the financial crisis of 2007-09.

Ashcraft and Schuermann (2008) present a detailed description of the process of securitization of subprime mortgages, of which conduits were one component. Nadauld and Sherland (2008) study the securitization by investment banks of AAA-rated tranches – "economic catastrophe bonds" as explained by Coval et al. (2008) – and argue that the change in the SEC ruling regarding the capital requirements for investment banks spurred them to engage in excessive securitization. Nadauld and Sherland (2008) view the banks as warehousing these risks for further distribution whereas Shin (2009) argues that banks were concentrating highly-leveraged risk exposures (given the low capital requirements) by so doing.

Our view in this paper is more along the lines of Shin (2009), Acharya and Richardson (2009), and Acharya and Schnabl (2009a), that banks were securitizing without transferring risks to outside investors, and in particular, conduits were a way of taking on systemic risk of the underlying pool of credit risks. In an analysis focused on the economic causes of the increasing propensity of the financial sector to take such risks (in one class of conduits – the "credit arbitrage" vehicles), Arteta et al. (2008) provide evidence consistent with government-induced distortions and corporate governance problems being the root causes (see also the arguments in Calomiris (2009)). Beltratti and Stulz (2009) examine bank stock returns during the financial crisis and find that stricter country-level capital regulation is correlated with better bank performance during the crisis. Covitz et al. (2009) use data on asset-backed commercial paper and show that the decline in securitized assets was driven by both market-wide factors and program fundamentals.

Our results on the difficulty in rolling over asset-backed commercial paper and the rise in their spreads are somewhat akin to the analysis of the run on the repo market by Gorton and Metrick (2009). They document that a counterparty risk measure for the banking sector as a whole, the "LIB-OIS" spread, explained over time the variation in the credit spreads of a large number of securitized bonds and the rise in repo haircuts, that is, the difference between the market value of an asset and its secured borrowing capacity. However, there are important differences between our "laboratory" and theirs. While conduits resemble repo transactions to some extent, the presence of explicit guarantees to conduits by sponsoring financial institutions establishes a direct linkage between the ability to issue commercial paper and the guarantee provided by the sponsor. We can therefore test directly for the impact of the guarantees on commercial paper issuance and spreads using variation across and within conduit sponsors over time, rather than relying on market-wide measures of banking sector health.

2. Institutional Background

2.1. Conduit structure

Figure 3 illustrates the typical conduit structure. A conduit is set up by a sponsoring financial institution (henceforth, sponsor). The sole purpose of a conduit is to purchase and hold financial assets from a variety of asset sellers. The conduit finances the assets by selling asset-backed commercial paper to outside investors such as money market funds or other "safe asset" investors.

Conduits typically exhibit a significant maturity mismatch. Most of the conduit assets are medium- to long-term assets with maturities of three to five years. Most of the conduit liabilities are asset-backed commercial paper with a maturity of 30 days or less. Conduits regularly roll over their liabilities and use proceeds from new issuances of asset-backed commercial paper to pay off maturing asset-backed commercial paper.

Most conduits minimize their credit risk by holding a diversified portfolio of high quality assets. Typically, they are restricted to purchasing AAA-rated assets or unrated assets of similar quality. Some conduits exclusively purchase unrated assets originated by their sponsoring financial institutions. Other conduits mostly purchase securitized assets originated by other financial institutions. Many conduits combine the two strategies by purchasing both securitized and unsecuritized assets from several financial institutions.

Outside investors consider asset-backed commercial paper a safe investment for three reasons. First, the pool of conduit assets is used as collateral to secure the asset-backed commercial paper. Second, the conduit's sponsor provides guarantees to the conduit, which ensures that the sponsor repays maturing asset-backed commercial paper in case the conduit is unable to pay off the maturing paper itself. Third, asset-backed commercial paper is very short-term, so that investors can easily liquidate their investment by not rolling over maturing asset-backed commercial paper.

Conduits can generate significant risks for the sponsor. The sponsor's guarantee typically covers the conduit's roll-over risk, which is the risk that a conduit cannot refinance maturing commercial paper, possibly because of a deterioration of conduit asset values. In that case, the sponsor has to assume the losses from lower asset values, because under the guarantee sponsors are required to repurchase assets at par. In exchange for assuming this risk, the sponsor receives the conduit profits.

From an incentive perspective, the use of guarantees to align risks and rewards within the sponsor is consistent with the optimal allocation of control rights under asymmetric information. Sponsors often use conduits to purchase assets originated by their customers, their own origination department, or other close parties, and may be better informed about asset quality than outside investors. The use of guarantees thus avoids the incentive problem inherent in other forms of securitization, in which the asset originator transfers most of the risks associated with the assets to outside investors. Instead guarantees ensure that sponsors have strong incentives to screen the conduit's asset purchases (e.g. see Ramakrishnan and Thakor (1984), Calomiris and Mason (2004) and Keys et al. (2009)).

The guarantees are also important because they ensure that asset-backed commercial paper qualifies for the highest available rating from accredited national rating agencies. The high ratings are important because the main purchasers of asset-backed commercial paper are money market funds, which are legally restricted to invest in securities with such ratings (Kacperczyk and Schnabl (2009)). Hence, the key issue with guarantees is whether the recourse of conduits to sponsor bank balance sheets is recognized as balance sheet risk and capitalized adequately.

2.2. Type of guarantees

Conduit sponsors use four different types of guarantees which provide different levels of insurance to outside investors. The four types of guarantees, ranked from strongest to weakest, are full credit guarantees ("full credit"), full liquidity guarantees ("full liquidity"), extendible notes guarantees ("extendible notes"), and guarantees arranged via structured investment vehicles ("SIV"). We briefly describe the structure of each guarantee.

Full credit guarantees are guarantees that require the sponsor to pay off maturing asset-backed commercial paper independent of the conduit's asset values. As discussed in more detail below, from a regulatory perspective, full credit guarantees are considered equivalent to on-balance sheet financing because they expose banks to the same risks as assets on the balance sheet. In practice, these guarantees are infrequently used by financial institutions that have to satisfy bank capital requirements but are more common among financial institutions that follow other forms of capital regulation.

Full liquidity guarantees are similar to full credit guarantees with the main difference being that the sponsor only needs to pay off maturing asset-backed commercial paper if the conduit assets are not in default. Hence, there is a possibility that full liquidity guarantees expire before the asset-backed commercial matures. However, full liquidity guarantees are structured to make this event highly unlikely. As discussed in detail below, the key idea is to define asset default as a function of a slow-moving variable such that the asset-backed commercial paper expires prior to the date at which the assets are declared in default. Indeed, as we show below, throughout the entire financial crisis there is not a single instance in which a full liquidity guarantee expired before the assets were declared in default.

Extendible notes guarantees are similar to full liquidity guarantees with the main difference being that the conduit issuer has the discretion to extend maturing commercial paper for a limited period of time (usually 60 days or less). By extending the maturity of the commercial paper, it is more likely that the conduits assets are in default before the commercial paper matures. From the viewpoint of an outside investor, extendible notes guarantees are therefore riskier than full liquidity guarantees. This guarantee was used by financial institutions with lower financial strength and by conduits with ex-ante higher quality assets.

SIV guarantees are also similar to full liquidity guarantees with the main difference being that SIV guarantees only cover a share of the conduit liabilities (usually around 25%). However, conduits with SIV guarantees also issue longer-maturity debt such as medium-term notes and subordinated capital notes. Since SIV guarantees do not cover all conduit liabilities, we consider SIV guarantees as providing partial insurance to outside investors. SIV guarantees were primarily used by commercial banks and other financial institutions to cover higher quality assets.

The partial transfer of risk, as in the case of extendible notes and SIVs guarantees, is consistent with security design models. In contrast, lack of any risk transfer, as in the case of full credit and full liquidity conduits is at odds with such models unless the underlying assets are mostly all of low quality, an unlikely scenario especially when these conduits were set up.

3. Theoretical Framework

The economic rationale for imposing capital requirements on banks comes from the premise that individual banks do not internalize the costs their risk-taking impose on other parts of the economy, in particular, other banks and the real sectors. For example, Diamond and Rajan (2000) explain why the market discipline provided by demandable debt may have to be counteracted with bank capital when bank assets contain aggregate risk. Acharya (2001) focuses on collective risk-shifting by banks in the form of herding to exploit their limited liability options and higher capital requirements on aggregate risky assets can serve as a way to counteract this incentive. Indeed, Gordy (2003) provides the foundation for the Basel I capital requirement framework based on the assumption that each bank is holding a diversified portfolio of economy-wide loans, thereby holding aggregate risk, and the job of the Basel I capital weights is to ensure that the resulting aggregate risk does not erode bank capital beyond a desired likelihood.

In effect, capital requirements increase the bank cost of capital with the intention of preventing them from undertaking certain risks that would otherwise seem privately attractive to banks. For instance, banks inherently perform maturity transformation, which is to borrow short and lend long. However, both on their (uninsured) liabilities and asset side, they are typically exposed to aggregate risk. To the extent that banks make profits by earning interest margins on the asset side over and above their cost of financing, they have a private incentive to raise leverage to reduce the cost of financing and undertake greater aggregate risk so as to earn higher risk premiums. In a world with imperfectly imposed capital requirements, banks would thus have incentives to "arbitrage" regulation and devise ways of synthesizing leveraged exposures to aggregate risks. In this paper, we examine this regulatory arbitrage hypothesis to explain the structure and performance of asset-backed commercial paper conduits. In particular, we test three hypotheses.

The first hypothesis is that commercial banks set up conduits to minimize regulatory capital requirements. In particular, commercial banks set up more conduits, and more so, with guarantees. This is because (i) banks taking deposits may have a natural advantage in providing guarantees (e.g., lines of credit), as argued by Kashyap, Rajan and Stein (2002), or because commercial banks have access to federal deposit insurance which causes economy's savings to move into bank deposits during times of aggregate stress, as documented by Gatev and Strahan (2005) and Pennacchi (2006); and, (ii) commercial banks are subject to strictest capital requirements in the financial sector and thus have greater benefits from regulatory arbitrage. Conversely, sponsors other than commercial banks set up conduits with weaker or no guarantees, and must substitute for absence of guarantees by choice of better assets, so that ex ante conduits with different guarantees reflect similar levels of risk or costs of borrowing.

The second hypothesis is that, ex post, when asset quality deteriorates and there is credit and liquidation risk to assets, conduits experience a "run" from their short-term credit providers, experiencing reduced ability to roll over debt and at higher spreads. The cost of redeeming debt that could not be rolled over and higher spreads are borne by conduit sponsors. The impact of asset quality deteriorates is larger for (i) weaker guarantees; (ii) weaker sponsor banks; and (iii) assets affected worst by the economic shock.

The third hypothesis is that no realized losses are passed on to creditors of conduits that are guaranteed, with some losses passed on to creditors of other conduits. Banks with greater exposure to conduits (relative to their size) experience worse stock returns once the run on conduits is initiated.

Put together, these hypotheses amount to establishing that a significant part of the conduit activity is a form of securitization without risk transfer, that is, a way for banks to concentrate aggregate risks rather than disperse them, and do so in an under-capitalized manner.

4. Empirical Analysis

4.1. Data and Summary Statistics

We use several different data sources for the analysis in this paper. We start by collecting ratings reports for asset-backed commercial paper conduits that cover all conduits rated by Moody's Investors Service for the period from January 2001 to December 2009. During this period, Moody's Investors Service issued reports on 938 conduits. The rating reports are typically three to five pages and contain information on conduit sponsor, conduit type, conduit assets, credit guarantees, and a verbal description of the conduit. Moody's Investors Service publishes the first report when a conduit receives its first rating and subsequently updates the reports annually. For some larger conduits, Moody's Investors Service also publishes monthly monitoring reports. Monthly reports are typically one page and comprise information on conduit size, guarantees, and conduit assets. In addition, Moody's Investors Service publishes a quarterly spreadsheet that summarizes basic information on all active conduits.

Our dataset is the universe of conduits collected from Moody's Investors Service's quarterly spreadsheets. We augment the dataset with information collected from the ratings reports. Some conduits have more than one observation because they have funding operations in both U.S. dollars and Euro. Since the funding operations belong to the same conduit, we merge these observations. We drop asset-backed commercial paper issued by collateralized debt obligations because their credit guarantees are not comparable to the rest of the sample (292 out of 9536 observations).

We merge this data set with a proprietary data set on all asset-backed commercial paper transactions conducted in the United States from January 2007 to February 2008. The data set contains 777,758 primary market transactions by 349 conduits over 292 trading days. The data are provided by the Depository Trust and Clearing Corporation (DTTC), the agent that electronically clears and settles directly- and dealer-placed commercial paper. For each transaction, DTCC provides the identity and industry of the issuer, the face and settlement values of the transaction, and the maturity of the security.

Using the DTCC data, we compute prices and quantities for asset-backed commercial paper. We compute overnight spreads as the yield on asset-backed commercial paper minus the federal funds target rate. We calculate the conduit-level weekly growth as the percentage change in asset-backed commercial paper. We merge the DTCC data set with the Moody's Investors Service data set.

We then use the Moody's rating reports to identify the sponsoring institution that is providing guarantees to the conduit. We first identify the type of sponsor (e.g., commercial bank, mortgage originator, structured finance group, monocline, etc.). If the sponsoring institution is a commercial bank, we look for the sponsor in the bank data set Bankscope. If we cannot identify a sponsor via Bankscope, we conduct an internet search. We match the sponsor to the consolidated financial company (e.g., we match conduits sponsored by Citibank South Dakota to Citigroup).

We construct a data set of the 300 largest banks as of January 2007 using the Bankscope database. If a consolidated company and its subsidiaries have more than one entry in Bankscope, we only keep the consolidated company. We use the ISIN identifier to match Bankscope data to share price data and stock return data from Datastream. If a bank does not have an ISIN identifier, we verify with the company website that the bank is not listed on a stock exchange. This data set allows us to compare banks that sponsor asset-backed commercial paper conduits with banks that do not sponsor asset-backed commercial paper conduits.

Finally, we use Moody's Investors Service Weekly Announcement Reports of rating downgrades from January 2007 to December 2008. We identify all conduits that were downgraded or were withdrawn during the analysis period. For all such conduits, we search for an affirmative statement by Moody's Investors Service that all outside investors were repaid prior to the downgrade or withdrawal. If there is no such affirmative statement we use announcements by the sponsor or other rating agencies to determine whether investors were repaid. If we do not find an affirmative statement that all investors were repaid, we assume that the conduit entered default. We note that this coding procedure may overestimate the extent of investor liquidation because investors may have been repaid without an affirmative announcement by either the sponsor or the rating agencies.

Panel A of Table 1 shows the ten largest conduits ranked by asset-backed commercial paper outstanding as of January 1, 2007. Most conduits hold highly rated assets originated in the United States or the United Kingdom. If a conduit hold assets that are not rated, the Moody's reports usually state that the conduit holds assets of similar quality as highly rated assets. The main asset classes are residential mortgages and asset-backed securities.

Panel B of Table 1 shows the ten largest sponsors ranked by total asset-backed commercial paper outstanding as of January 1, 2007. In the United States, the largest sponsor is Citigroup with conduit assets of $92.7 billion. For comparison, Citigroup's regulatory capital (Tier 1 Capital) is $90 billion. In Europe, the largest sponsor is ABN Amro with $68 billion of conduits assets. ABN Amro's regulatory capital $31.2 billion (ABN Amro later merged with Royal Bank of Scotland). Most sponsors are large commercial banks based in the United States and European countries.

Panel A of Table 2 provides summary statistics for all conduits authorized to issue asset-backed commercial paper as of January 1, 2007. Panel A shows that there are 301 conduits with total commercial paper outstanding of $1,236 billion. The average conduit size is $4.1 billion with a standard deviation of $5.1 billion. About 61% of asset-backed commercial paper is covered by full liquidity guarantees, 13% is covered by full credit guarantees, 18% is covered by extendible notes guarantees, and 7% is covered by SIV guarantees.

In terms of assets, we use Moody's classification for a conduit's main asset types. About 31% of conduits assets are invested primarily in asset-backed securities. Moody's rating reports suggest that this asset category includes mortgage-backed securities, collateralized debt obligations, and collateralized loan obligations. About 5% of conduits assets are invested primarily in loans. Moody's rating reports suggests that most loans are mortgage loans that are warehoused for future securitization. Some conduits also own student loans, auto loans, corporate loans, and consumer loans. About 35% of conduit assets are invested in receivables. Moody's reports suggest that most receivables are trade receivables and credit card receivables. About 22% of conduits assets are invested in a mix of asset-backed securities, loans, and receivables. The remaining 7% of conduit assets are invested in other asset classes, which include repurchase agreements and government guaranteed loans.

We understand from the Moody's rating \reports that almost all conduits are hedged against currency and interest rate exposure. The most common way for conduits to hedge their currency exposure is by matching the currency of the assets with the currency of the liabilities. Consistent with our earlier observation that most assets are originated in the United States, we find that 75% of asset-backed commercial paper is issued in U.S. dollars. About 18% is issued in Euro and the remainder is issued in Yen, Australian dollars, and New Zealand dollars.

Panel B of Table 2 presents summary statistics for all sponsors as of January 1, 2007. We define a sponsor as a single consolidated company and aggregate asset-backed commercial paper at the holding level. In total, there are 127 sponsors, each of which, on average, sponsors $9.7 billion of asset-backed commercial paper. The largest sponsor type is commercial banks, which sponsor $911 billion of asset-backed commercial paper. The second largest type is structured finance groups which sponsor $156 billion in asset-backed commercial paper. Contrary to commercial banks, structured finance groups usually do not have the financial resources to provide guarantees. Instead they purchase guarantees from other financial institutions. Unfortunately our data do not contain information to identify the provider of guarantees to conduits of structured finance groups. There is some evidence from industry publications that investment banks are large providers of guarantees to structured finance groups. Other large sponsor types are mortgage lenders ($76 billion), investment managers ($18 billion) and investment banks ($11 billion).

In terms of geography, the majority of conduits are sponsored by financial institutions based in the United States with $491 billion of asset-backed commercial paper. A large number of sponsors are based in Germany and the United Kingdom with asset-backed commercial paper of $204 billion and $195 billion, respectively. The remaining $347 billion are sponsored by financial institutions based in other countries, including financial institutions based in Australia, Belgium, Canada, France, Netherlands, and Japan.

4.2. Capital Requirements

Bank regulation requires banks to hold a certain amount of capital against its investments. One way to reduce one's capital requirements is to transfer the risks of investments to outside investors. Over the last two decades, securitization has emerged as one of the main risk transfer mechanism for banks. Bank regulators have recognized such risk transfer and modified bank capital regulation to reduce capital requirements accordingly. However, our analysis suggests that banks used asset-backed commercial conduits for securitization without transferring risks to outside investors. To explain the mechanics of such securitization, we first describe the capital regulation of asset-backed commercial paper conduits. Since almost all conduits were sponsored by banks based in the United States and European countries, we focus on bank regulation in these countries. We start by describing bank capital regulation in the United States.

Historically, bank regulators in the United States made a clear distinction between full credit and full liquidity guarantees. Full credit guarantees were considered to cover credit risk and thus considered equivalent to on-balance sheet financing. As a result, assets covered by full credit guarantees required the same regulatory capital charges as assets on the balance sheet. In contrast, full liquidity guarantees were considered to cover liquidity risk, which did not require regulatory capital. Similarly, extendible notes guarantees and SIV guarantees were considered weaker forms of full liquidity guarantees and did not have capital charges either. As a result, there was a sharp discontinuity between the regulatory requirements of full credit guarantees and the regulatory requirements of other types of guarantees.

In response to this regulation, banks developed guarantees which were classified as full liquidity guarantees but effectively covered credit risk. The guarantees were structured as follows. The sponsor committed to repurchase assets at par value from the conduit if the conduit was unable to pay off maturing debt *and* the assets in the conduit were not in default. The banks were careful to make the guarantee conditional on asset default because otherwise regulators classified such guarantees as full credit guarantees.

The most important aspect of this guarantee was to define asset default such that assets almost never defaulted before the asset-backed commercial paper was due. In practice, most sponsors defined asset default as downgrades below investment grade (rated assets) or increases in delinquency rates above pre-specified thresholds (unrated assets). Given the requirement that most assets were highly rated, or of similar quality, it was unlikely that assets entered default quickly. The reason was that rating agencies usually provided ample warnings prior to downgrades (rated assets) and delinquency rates only moved slowly (unrated assets). Moreover, asset-backed commercial paper was very short-term with a median maturity at issuance of overnight and a median maturity of outstanding asset-backed commercial paper of less than 30 days.

Hence, even though it was possible that assets entered default prior to the expiration of the asset-backed commercial paper, it was highly unlikely. Instead, outside investors could simply stop rolling over asset-backed commercial paper upon adverse news about the credit or liquidity risk of conduit assets. In fact, the guarantees were mostly likely to be drawn in the states of the world in which assets were expected to suffer losses. As a result, full liquidity guarantees effectively covered the assets' credit risk without requiring banks to hold regulatory capital.

A number of industry publications describe the benefits of circumventing capital requirements by using this type of guarantees. For example, a publication by Moody's Investor Services (2003) on the fundamentals of asset-backed commercial paper describes conduits as follows: "If a bank were to provide a direct corporate loan, even one secured with the same assets, it would be obligated to maintain regulatory capital for it. An ABCP program permits the sponsor to offer financing services to its customers without using the Sponsor's balance sheet or holding incremental regulatory capital (p. 15)"

In 2001, the Financial Accounting Standards Board (FASB) in the United States started a review of guarantees to conduits. FASB initiated this review because of the bankruptcy of the energy company Enron. Enron had used off-balance sheet vehicles for concealing its true leverage and these off-balance sheet vehicles were structured similarly to asset-backed commercial paper conduits. This review of conduits generated considerable concern in the banking industry. For example, in July 2002 Moody's Investor Services (2002a) reports under the headline "FASB reacts to Enronitis" that FASB is proposing the consolidation of asset-backed commercial paper conduits on bank balance sheets. In October 2002, Moody's published a special report titled "The FASB Consolidation Proposal: The End of ABCP as we know it?" which suggests that sponsors may have difficulties with consolidation because it would raise regulatory capital requirements and might lead banks to violate their debt covenants.

In January 2003, FASB issued a directive for the consolidation of conduits under Interpretation No. 46 (FIN 46). In response, Forbes (2003) reported that "FASB Puts Banks in a Bind" because conduit consolidation would negatively affect bank balance sheets. The article quotes the FASB chairman as saying that "If you have risk and reward related to the operation, we thought it was enough to say it ought to be on your books". However, the FASB proposal was considered unclear with respect to certain implementation issues and several banks requested more guidance from FASB.

In May 2003, Standard & Poor's (2003) reports that a "Panelist from OOC acknowledges [...] Regulatory Relief at S&P seminar". The Standard & Poor's report states that a representative of the Office of the Comptroller of the Currency (OCC) acknowledged that his agency and other regulatory bodies are putting together an approach that would reduce capital requirements required under the FASB proposal. However, the relief would only last until the end of 2003 or March 2004. In December 2003, FASB issued a new directive called FIN 46R ("R" for revision) which clarified the consolidation issues. The new directive effectively required commercial banks to consolidate asset-backed commercial paper conduits.

However, in July 2004, a consortium of bank regulators, namely the Office of the Comptroller of the Currency, the Federal Reserve Board, the Federal Deposit Insurance Corporation, and the Office of Thrift Supervision (henceforth, the Agencies), issued a new rule for computing capital requirements of asset-backed commercial paper conduits. The official press release (Federal Reserve Board, 2004) by the Agencies states that "[t]he final rule will permanently permit sponsoring banks, bank holding companies, and thrifts (collectively, sponsoring banking organizations) to exclude from their risk-weighted asset base those assets in ABCP programs that are consolidated onto sponsoring banking organizations' balance sheets as a result of FIN 46R". Hence, the bank regulator effectively issued an exemption of capital requirements for asset-backed commercial paper conduits. Under the exemption, assets in conduits were not considered assets for the purpose of calculating capital requirements. Instead, bank regulators required that banks had to hold capital at a conversion factor of 10% against the amount covered by full liquidity guarantees. This implied that regulatory charges for conduit assets were 90% lower than regulatory charges for on-balance sheet financing (Gilliam (2005)).

Consistent with the regulatory arbitrage motive, Figure 3 shows that the growth of asset-backed commercial paper conduits stalled in late 2001, around the time when FASB started its review of conduits. From late 2001 to late 2004, asset-backed commercial paper outstanding is flat after several years of significant growth. However, starting in late 2004, at the time bank regulator issued their exemption, growth in asset-backed commercial paper picks up again. This time-series evidence indicates that lower capital requirement played an important role in the decision to set up conduits.

In Europe, the history of capital requirements for asset-backed commercial paper conduits was slightly different. Before 2004, most European countries had similar capital requirements for guarantees as in the United States. Full credit guarantees were considered to cover credit risk and required the same regulatory charges as on-balance sheet financing. Full liquidity guarantees were considered to cover liquidity risk and had no capital charges.

The main difference between the United States and Europe was that European banks started to adopt International Financial Reporting Standards (IFRS) in the early 2000s. IFRS, contrary to U.S. General Accepted Accounting Principles (GAAP), do not recognize asset transfers to conduits as a true sale. As a result of this regulation, European banks were required to consolidate conduits on their balance sheets. However, most European regulators did not change capital requirements in accordance with IFRS. Hence, for the purpose of computing regulatory requirements and risk weighted assets, conduits were considered off-balance sheet and European banks did not have to hold regulatory capital against conduit assets.

Another difference between the United States and European countries was that European bank regulators were in the process of adopting the Basel II framework (U.S. commercial banks were still operating under Basel I). Under the Basel II standardized approach, the capital requirements for conduit assets covered by full liquidity guarantees increase from 0% to 20% relative to on-balance sheet financing. Moreover, Basel II assumes lower risk weights for highly rated securities, which reduces the level of regulatory charges for both off-balance sheet and on-balance sheet financing. At the start of the financial crisis, several European banks had adopted Basel II rules, while others were still operating under Basel I. Importantly, both Basel I and Basel II rules allowed for "regulatory arbitrage" of capital requirements, although the benefit of regulatory arbitrage was smaller under Basel II than under Basel I.

We note that two European countries, Spain and Portugal, differed in their regulation of capital requirements from other European countries. These countries required sponsors to hold the same amount of regulatory capital for assets on balance sheets and for assets in asset-backed commercial paper conduits. Consistent with the regulatory arbitrage motive, we find that Spanish and Portuguese banks did not sponsor asset-backed commercial paper conduits (Acharya and Schnabl, 2009b).

We also note that the incentive to use guarantees for circumventing capital requirements was particularly strong for commercial banks. Commercial banks were considered to have the strictest capital regulation of all financial institutions because of their special status as deposit-taking institutions. Commercial banks should therefore derive the largest benefits from using guarantees to reduce capital requirements.

Consistent with this motive, Table 3 shows that commercial banks are the main sponsors of asset-backed commercial paper. They sponsor asset-backed commercial paper worth $911 billion, or 73.7% of total asset-backed commercial paper outstanding. Also, commercial banks are more likely than other financial institutions to use full liquidity guarantees with 74% of its conduit assets covered by full liquidity guarantees. For comparison, the second-largest group of sponsors, structured finance groups, sponsor $156 billion, or 12.6% of total asset-backed commercial paper outstanding. Contrary to commercial banks, the main guarantees used by structured finance groups are full credit guarantees covering 37% of conduit assets.[8]

4.3. Impact of Guarantees on Spreads and Outstandings

In this section, we examine the importance of guarantees in rolling over maturing asset-backed commercial paper after the start of the financial crisis. As shown in Figure 1, asset-backed commercial paper declined dramatically after the start of the financial crisis on August 9, 2007. By the end of year, the asset-backed commercial paper market was roughly 30 percent smaller than it was at its peak in July. Importantly for our analysis, the extent of the decrease varied substantially by type of guarantee.

To test for the importance of guarantees in rolling over asset-backed commercial paper after August 9, 2007, we exploit cross-sectional variation in types of guarantees. As discussed, full credit and full liquidity guarantees cover almost all risks associated with conduits assets. However, extendible guarantees are weaker guarantees because they allow conduits to extend commercial paper for a limited period of time, an option that issuers are likely to exercise when there is adverse news about conduit assets. SIV guarantees are also weaker guarantees because these guarantees only cover asset-backed commercial paper outstanding but not other liabilities such as medium term notes and capital notes.

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[8] We do not have data on the providers of guarantees to structure finance groups. However, some industry reports indicate that the main providers were large U.S. investment banks, which used internal rating models for computing capital charges (Nadauld and Sherlund, 2008). Internal rating models made less distinction between full credit and full liquidity guarantees.

To understand the selection of sponsors and assets into guarantees, it is important to understand the sponsor's objective. Usually, sponsors aim to put together a conduit structure (consisting of the guarantee, conduit assets, and the sponsor's financial strength) which allows the sponsor to issue highly rated asset-backed commercial paper at rates similar to the Fed Funds rate (overnight) or LIBOR (30-days). Sponsors trade off various characteristics to achieve this pricing on the asset-backed commercial paper. For example, conduits with higher quality assets are usually covered by weaker guarantees. Also, sponsors with lower financial strength tend to provide weaker guarantees and have to provide higher quality assets.

Table 4 provides summary statistics on assets and sponsor types by guarantees. For full liquidity guarantees, the main sponsor type is commercial banks covering 89.9% of asset-backed commercial paper outstanding. The three main asset types covered by full liquidity guarantees are receivables (42.6%), asset-backed securities (29.2%), and mixed assets (20.8%). For full credit guarantees, the main sponsor types are commercial banks (62.4%) and structured finance groups (36.5%). The three main asset types are mixed assets (39.4%), receivables (37.9%), and asset-backed securities (10.2%). These results suggests that conduits covered by full liquidity and full credit guarantees are similar in terms of assets. Regarding sponsors, the main difference is that structured finance groups are more likely to provide full credit guarantees than full liquidity guarantees.

For extendible notes guarantees, we find that the main sponsor types are commercial banks (33.8%), mortgage originators (27.1%), and structured finance groups (23.6%). The main asset types are asset-backed securities (28.8%), receivables (24%), mixed assets (23%), and loans (15.6%). For SIV guarantees, the main sponsor types are commercial banks (61.8%) and structured finance groups (34.5%). SIVs only invest in asset-backed securities (91.3%) and loans (8.7%). These summary statistics suggest that financial institutions with less financial strength, such as mortgage originators, are more likely to provide weaker guarantees, in particular extendible notes guarantees. Also, extendible and SIV guarantees are more likely to cover asset-backed securities, which were considered of higher quality before the financial crisis.

We note that the average spread of overnight asset-backed commercial paper over the Fed Funds rate was only one basis point prior to the financial crisis. Importantly, there was no variation across guarantees, which suggest that, from an ex-ante perspective, outside investors perceived conduits with different guarantees to have similar risks.

To test the cross-sectional impact of guarantees formally, we compute asset-backed commercial paper outstanding and spreads of overnight asset-backed commercial paper both before and after the start of the financial crisis. We restrict our sample to the period three months before and three months after the start of the financial crisis on August 9, 2007. We choose this period because it captures the main decline in asset-backed commercial paper but excludes later events that may confound our analysis (e.g., Bear Stearns merger, Lehman bankruptcy). We find qualitatively and quantitatively similar results if we extend our data set to the period six months before and six months after the start of the financial crisis. We include all sponsors in our main results. For our results on sponsor quality, we restrict our sample to conduits that we can match to the sponsor's credit default swap (CDS) spread.

We first examine the impact of guarantees non-parametrically. Figure 5 shows that asset-backed commercial paper covered by extendible guarantees and SIV guarantees decreased significantly more than asset-backed commercial paper covered by full credit and full liquidity guarantees. Similarly, Figure 6 shows that the overnight spread on asset-backed commercial paper covered by extendible guarantees and SIV guarantees increased more than the spread on asset-backed commercial paper covered by full credit and full liquidity guarantees.[9] The figures indicate that there was a negative shock to the supply of funds provided by outside investors leading to a large decline in quantity and a large increase in price.

We test whether the patterns on issuance and spreads by type of guarantee are statistically significant and robust to controlling for sponsor and conduit characteristics. Our baseline specification is:

$$\log(CP_{it}) = \alpha + \beta Guarantee_j + \gamma After_t * Guarantee_j + Time_t + \varepsilon_{it}$$

where $\log(CP_{it})$ represents the natural logarithm of the face value of commercial paper outstanding of conduit *i* in week *t*. $Guarantee_j$ is a fixed effect by type of guarantee. $After_t$ is an indicator variable that equals one after the start of the crisis (after August 9,

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[9] We focus on overnight spreads because most newly issued ABCP has maturities of one to four days. According to data from the Federal Reserve Board, roughly 60 percent of newly issued ABCP in the U.S. has maturities of one to four days prior to the crisis. Our results are similar when considering one-month spreads (one month is the second most frequent maturity after overnight)

2007) and zero before the crisis. $Time_t$ represent fixed effects by sponsor and by week. We also estimate regression in which we control for conduit fixed effects and sponsor-time fixed effects.

We are primarily interested in the coefficient γ on the interaction of $After_t$ and $Guarantee_j$, which captures the average change in commercial paper outstanding by guarantee after the start of the financial crisis. The omitted guarantee category is full liquidity guarantees. We cluster standard errors at the conduit level because our variable of interest varies at the conduit level and we want to allow for the correlation of error terms within conduits.

If the financial crisis makes investors more concerned about conduit risks, we expect that the interactions between indicator variables for weak guarantees and the $After_t$ indicator to be more negative than those for strong guarantees. Furthermore, if full credit and full liquidity guarantees provide the same level of protection for outside investors, we expect that the interaction between the indicator variable for full credit support and the $After_t$ dummy to be statistically insignificant. Together these hypotheses are aimed at uncovering whether guarantees were important for outside investors to roll over maturing asset-backed commercial paper upon adverse news about asset quality.

Column (1) in Table 5 reports the results of estimating our baseline specification. The significant coefficient on the interaction between the $After_t$ indicator and the dummies for programs with extendible notes and SIVs suggest that asset-backed commercial paper decreased more for conduits with weaker guarantees compared to conduits with stronger guarantees. The coefficient on the interaction between the $After_t$

indicator and the dummies for full credit programs shows that there is no statistically significant difference between full liquidity and full credit guarantees. Column (2) adds controls for time fixed effects. The time fixed effects control for a non-parametric time-trend but have no effect on the coefficients of interest. Column (3) adds controls for conduit fixed effects. The conduit fixed effects control for the average amount of asset-backed commercial paper outstanding. We find no change in the coefficients of interest. These results suggest that conduits with weaker guarantees experienced a significantly larger decline in asset-backed commercial paper outstanding.

One possible concern with these results is that guarantees proxy for the quality of the sponsor. If sponsors of full liquidity and full credit guarantees are of higher quality after the start of the financial crisis, this may bias our results. To control for time-varying sponsor quality, Column (4) adds controls for sponsor-time fixed effects. These variables control for time-varying changes at the sponsor level such as changes in the financial strength of the sponsor. Put differently, the coefficients are identified off variation within sponsors at a given point in time (e.g., comparing conduits with full credit guarantees, full liquidity guarantees, extendible guarantees, and SIV guarantees for the *same* sponsor). We find that the point estimates are robust to controlling for these fixed effects. The standard errors are larger than in Columns (1) to (3), but the effect of extendible guarantees remains marginally statistically significant. This result suggests that guarantees significantly affect the conduit's ability to roll over asset-backed commercial paper even after controlling for changes in sponsor quality.

Another possible concern is that our results may reflect differences in asset quality across conduits with different guarantees. As discussed above, conduits with weaker guarantees are more likely to hold asset-backed securities and are less likely to hold receivables. Even though asset-backed securities may have been of higher quality ex-ante, they may be of lower quality ex-post which could bias our result. We therefore control for asset quality by including indicator variables for asset types and interactions between the $After_t$ indicator and asset type indicators.

Columns (5) to (8) report the results. Based on our baseline specification, we find that the coefficients of interest are almost unchanged after controlling for asset classes (Columns 1 and 5). We find similar results in specifications that control for time fixed effects (Columns 2 and 6), conduit fixed effects (Columns 3 and 7) and sponsor-time fixed effects (Columns 4 and 8).

We note that our asset controls have some explanatory power for changes in asset-backed commercial paper outstanding. In particular, the coefficient on the interaction of the $After_t$ indicator and loans is always negative and statistically significant. This result indicates that loans, which are primarily mortgage loans, had a negative impact on the conduit's ability to roll over asset-backed commercial paper. The coefficient on the interaction of the $After_t$ indicator and receivables is usually positive but not statistically significant. The point estimate indicates that receivables, which are primarily trade receivables and credit card receivables, had a positive impact on the conduit's ability to roll over asset-backed commercial paper.

Hence, even though our asset controls can explain a conduit's ability to roll over asset-backed commercial paper, they have little impact on the coefficients of interest. This result suggest that guarantees are an important determinant of a conduit's ability to roll over asset-backed commercial paper upon adverse news, even after accounting for the quality of the assets. However, we caution our interpretation because we cannot perfectly control for asset quality.

We also examine whether the impact of guarantees is stronger for riskier banks. We measure the riskiness of the sponsor using the sponsor's CDS spread. We expect that the decrease in asset-backed commercial paper of conduits with weaker credit guarantees is more pronounced if the sponsor is risky. We test this hypothesis by adding sponsor CDS spreads and their two-way interactions with the dummies for type of guarantee and the $After_t$ indicator to the baseline specification. We note that this estimation uses a smaller sample because we restrict the analysis to sponsors with CDS spreads.

Table 6 reports the results. Columns (1) to (4) estimate our baseline specification using the restricted sample. We note that the results are similar to Table 5. Columns (5) to (8) add the triple interaction of the $After_t$ indicator, the $Guarantee_j$ indicators, and the CDS spread. The regressions also include all two-way interactions. Columns (5) and (6) find a negative and statistically significant effect on the interaction of sponsor CDS spreads with extendibles in the post-period. This finding suggests that the impact of weak guarantees is larger for riskier banks. However, the results become insignificant once we control for conduit fixed effects or sponsor-time fixed effects. This result suggests that the financial strength of the sponsor affects the conduit's ability to roll-over asset-backed commercial paper but the effect is not very robust.

We also estimate the impact of guarantees on overnight spreads of asset-backed commercial paper. Again, our baseline specification is:

$$Spread_{it} = \alpha + \beta Guarantee_j + \gamma After_t * Guarantee_j + Time_t + \varepsilon_{it}$$

where $Spread_{it}$ is the overnight spread (1 to 4 days of maturity) over the Federal Funds rate on new issues by conduit *i* on day *t*. All right-hand side variables have the same interpretation as in the issuance regression, but time-dependent variables are now measured daily.

Column (1) in Table 7 reports the results of estimating our baseline specification. The significant coefficients on extendible notes and SIVs suggest that spreads increase more for conduits with weaker guarantees compared to conduits with stronger guarantees. The coefficient on full credit guarantees shows that there is no statistically significant difference between full credit and full liquidity guarantees. Columns (2) and (3) show that the results are robust to controlling for time fixed effects and conduit fixed effects. Column (4) controls for sponsor-time fixed effects, such that the coefficients are estimated off variation across guarantees for the same sponsor. We find that results are robust but the point estimate on extendible is not statistically significant. Overall, these results suggest that guarantees affect the spreads on overnight asset-backed commercial paper even after controlling for changes in sponsor quality.

Column (5) to (8) control for asset classes using indicator variables for asset classes and interactions of the $After_t$ indicator and asset classes. We find that coefficients on the interaction of the $After_t$ indicator and extendibles decreases after controlling for asset classes and are not statistically significant. However, all point estimates remain positive. The coefficients on the $After_t$ indicator and SIV guarantees remain almost unchanged and are statistically significant. Moreover we find that the coefficient on the interaction of the $After_t$ indicator and the loans indicator is generally positive and the coefficient on the interaction of the $After_t$ indicator and receivables indicator is positive. Overall, the results are suggest that spreads increase more for weaker guarantees even after controlling for asset classes.

Table 8 examines whether the impact of guarantees is stronger for riskier banks using CDS spreads. Again, we report the baseline specifications for the restricted sample in Columns (1) and (4). The results for the restricted sample are similar to Table 7. Columns (5) to (8) report specification with triple interactions of the $After_t$ indicator, the $Guarantee_j$ indicators, and the CDS spread. We include all two-way interactions. Columns (5) and (6) find a stronger effect of extendibles for riskier banks. There is no statistically significant effect for SIV guarantees. After controlling for conduit-fixed effects and sponsor-time fixed effects, the coefficients become insignificant. Overall, these results suggest that the impact of guarantees is stronger for riskier banks but the results are not very robust.

In summary, we find that after the start of the financial crisis conduits with weaker guarantees decreased issuance more and paid higher spreads than conduits with stronger guarantees. These patterns are somewhat stronger for weaker sponsors as measured by CDS prices, suggesting that quantities and prices in the asset-backed commercial paper market are correlated with the strength of the sponsoring banks. Also, the patterns suggest that the full credit guarantees and full liquidity guarantees were an important part of rendering asset-backed commercial paper risk-free for outside investors.

4.4. Losses of Outside Investors

This section examines the extent of realized risk transfer by analyzing whether outside investors in asset-backed commercial paper were fully repaid after the start of the financial crisis. The analysis complements the analysis of the impact of guarantees on asset-backed commercial paper outstanding and asset-backed commercial paper spreads. We take the perspective of an investor that was holding asset-backed commercial paper at the start of the crisis and examine whether the investor suffered losses by not rolling over maturing asset-backed commercial paper.

We test the performance of credit guarantees using Moody's Investors Service announcement data from January 2007 to December 2008. Since all conduits are rated, Moody's Investors Service always issues an announcement if a conduit defaults on its obligation to pay off maturing asset-backed commercial paper.

Table 9 presents the results on the ex-post risk transfer. Column (1) reports asset-backed commercial paper outstanding per credit guarantee in July 2007. Columns (2) to (4) show the value-weighted percentage in three categories: conduits that were closed down and repaid all maturing asset-backed commercial paper before December 2008, conduits that remained active and repaid all maturing commercial paper up to December 2008, and conduits that failed to repay maturing asset-backed commercial paper and entered default by December 2008.

The table shows that not a single conduit covered by full credit or full liquidity guarantees defaulted by December 2008. In contrast, 7.4% of conduits covered by extendible notes guarantees and 16.7% of conduits covered by SIV guarantees defaulted by December 2008, respectively. Regarding the sponsor type, we find that conduits sponsored by structured finance firms and mortgage companies were significantly more likely to enter default than conduits sponsored by commercial banks. Overall, we note that 97.5% of outside investors in asset-backed commercial paper were fully repaid.

We do not have data on the losses on conduit assets. The losses depend on the loss rate on conduit assets and unfortunately there is no publicly available information with respect to such loss rates. However, we can use different pieces of information to form an estimate. For example, State Street (2009) announced an after-tax loss of $3.7 billion on conduit asset of $21.8 billion, which amounts to a loss-rate of 22.6% (assuming a tax rate of 25%). Also, the AAA-tranche of ABX-index suggests that the value of collateralized mortgage obligations backed by subprime mortgages dropped by up to 60 percent in months after the start of the financial crisis. The losses on conduit assets are likely to be smaller because many conduits both non-mortgage assets such as receivables. We therefore assume more conservative loss rates of 5% and 15%. Under this assumption, we estimate total losses on conduit assets of $68 billion and $204 billion, respectively. The estimated losses for outside investors are $1.8 billion and $5.2 billion respectively. Consistent with the lack of risk transfer, this analysis shows that most of the losses were borne by sponsors rather than outside investors. However, the level of the estimated losses is only suggestive because we lack the data to compute actual losses.

4.5. Effect of Conduit Exposure on Sponsor Stock Returns

This section analyzes whether banks with higher conduit exposure experienced lower stock returns during the financial crisis. The difficulty in testing this hypothesis is that the financial crisis also affected banks in other ways, some of which may be correlated with conduit exposure. Hence, if we observe that banks with higher conduit exposure have lower returns, then this result may be driven by other bank activities that negatively affect stock prices and are correlated with conduit exposure.

To address this identification issue, we focus on the start of the crisis in the asset-backed commercial paper market on August 9, 2007. We believe this provides a good setting to identify the impact of conduit exposure for two reasons. First, the financial crisis arguably started with the announcement of difficulties in the subprime mortgage market. As shown in Figures 1 and 2, starting on August 9, 2007, investors drastically reduced refinancing of maturing asset-backed commercial paper and, as a result, overnight spreads jumped from 10 basis points to 150 basis points. Hence, it is unlikely that the event study is confounded by other events that happened just prior to August 9, 2007. Second, our analysis focuses on the narrow three-day window around August 9, 2007. This short event window reduces the likelihood that the results may be confounded by other events that happen around the same time.

We start by examining observable characteristics of banks with and without conduit exposure. We restrict our sample to banks with assets of $5 billion or more as of January 1, 2007, because only these banks had the financial strength to support conduits (our results are robust to including smaller banks). We further restrict our analysis to commercial banks based in Europe and the United States and to banks for which share price data is available. We choose this restriction because some countries outside the United States and Europe (in particular Canada) allowed for differently structured credit guarantees which are not comparable.

Table 10 shows the distribution of banks by conduit exposure. We measure conduit exposure as asset-backed commercial paper outstanding relative to equity capital as of January 1, 2007. We sort banks into three groups: banks without conduits, banks with low conduit exposure, and banks with high conduit exposure. Consistent with our main hypothesis, we find that stock returns were lower for banks with higher conduit exposure. In fact, the data suggest that stock returns monotonically decrease in conduit exposure.

To control for difference in observable characteristics, we estimate the baseline specification:

$$R_i = \alpha + \beta ConduitExp_i + \gamma X_i + \varepsilon_i$$

where R_i is the cumulative stock return of bank *i* computed over the three-day period from August 8, 2007, to August 10, 2007, $ConduitExp_i$ is bank *i*'s conduit exposure, X_i are bank *i*'s observable characteristics as of January 1, 2007, and ε_i is a bank-specific error term. We estimate this specification using robust standard errors to allow for correlation across error terms.

Table 11 presents the results. Column (1) shows that an increase in conduit exposure from 0% to 100% (e.g., Wells Fargo to Citibank) reduces the stock return during the three-day event window by 2.6 percentage points. Column (2) controls for banks size using the natural logarithm of assets and the natural logarithm of equity. The coefficient on conduit exposure decreases to 1.4 percentage points but remains statistically significant. Column (3) adds controls for the equity ratio and the result remains unchanged. Columns (4) and (5) add control variables for funding sources such as the share of deposit funding and the share of short-term debt funding and the results are unaffected. Column (6) adds indicator variables for the country of the sponsoring institution's headquarters. Again, the coefficient of conduit exposure is unaffected and remains statistically significant.

We interpret these results as evidence that banks with higher conduit exposure were more negatively affected by the crisis in the asset-backed commercial paper market. The coefficient is probably a lower bound of the impact, because investors may have underestimated the severity of the downturn or may not have been fully aware of the (relatively opaque) credit guarantees provided to conduits. Also, investors may have anticipated some of the losses because of prior announcements about losses on subprime assets.

To ensure that the results are not driven by outliers, we construct an alternative measure of exposure. We compute the mean exposure of all banks with positive exposure to conduits and divide the banks in two groups: banks with low exposure (below mean) and banks with high exposure (above mean). We estimate the baseline specification using indicator variables for banks with low exposure and bank with high exposure and in unreported results find qualitatively and quantitatively similar effects. We also drop outliers in terms of conduit exposure and banks with less than $50 billion in assets and our results are qualitatively and qualitatively unchanged.

We also examine the relation of conduit exposure and stock returns in the months prior to August 2007. For each month from January 2007 to August 2007, we estimate the same set of regressions as in Table 11 including all controls. Table 12 presents the results. We find no statistically significant relationship between conduit exposure and stock returns from January 2007 to July 2007. However, in the month of the crisis in the asset-backed commercial paper market, August 2007, we find a negative and statistically significant effect of conduit exposure on stock returns after controlling for the full set of observables. The coefficient is twice as large as the coefficient in Table 10. Again, this finding suggests that investors revised their expectation of the negative effect of conduit exposure on stock returns upwards for several days after the start of the financial crisis. However, we caution our interpretation because the estimation is over a longer event window and therefore may be confounded by other factors.

5. Benefits to banks of securitization without risk transfer

The empirical analysis shows that banks suffered significant losses because conduits were unable to roll over maturing asset-backed commercial paper. This raises the question of how large was the benefit to banks from by setting up conduits.

We can assess the benefits to banks by quantifying how much profit conduits yielded to banks from an ex-ante perspective using a simple back-of-the-envelope calculation. Assuming a risk weight of 100% for underlying assets, banks could avoid capital requirements of roughly 8% by setting up conduits relative to on-balance sheet financing. We assume that banks could finance debt at close to the riskless rate, which is consistent with the rates paid on asset-backed commercial paper before the start of the financial crisis. Further assuming an equity beta of one and a market risk premium of 5%, banks could reduce the cost of capital by 8%*5%=0.004 or 40 basis points by setting up conduits relative to on-balance sheet financing.

It is difficult to estimate the profits generated by conduits because only a few banks report revenues from conduits. For example, Deutsche Bank reports in its annual report in December 2007 that conduits generated fees of Euro 6 million relative to a total commitment of Euro 6.3 billion. Similarly, Bank of New York Mellon reports in December 2006 revenues of $3 million relative to a commitment of $3.2 billion (Arteta et al., 2008). Assuming that conduits have no costs and revenues are equal to profits, banks earned about 10 basis points on conduit assets.

Comparing this cost and benefit of conduits, it seems clear that conduits would not have been profitable if banks had been required to hold equity against their assets in conduits. In fact, banks would have made a loss of 30 basis points on each dollar invested. However, given that banks were not required to hold equity, they could earn a "profit" of 10 basis points. Conduits were thus a relatively low-return activity but offered a way for banks to attract money-market savings and increase bank size without increasing regulatory capital.

Table 13 lists the 30 largest conduit sponsors. We find that missing capital - the additional capital if conduit asset had been on bank balance sheet - was on average 6.1% of total equity or about $68 billion in total across banks. This is not necessarily a large amount of equity capital, but it masks considerable heterogeneity across banks as the proportion of missing capital ranges from 1.7% to 79.9% of capital levels. The bank with the largest exposure, Sachsen Landesbank, was the first large bank to be bailed out on 17 August 2007 because it was unable to provide the guarantees it had extended to its conduits. Other banks with large exposure such as Westdeutsche Landesbank and ABN Amro (later bought by Royal Bank of Scotland) also suffered large losses due to recourse from conduits and had to be bailed out. Hence, for some smaller banks the conduit activities were in fact large enough to wipe out the entire bank capital. For lager banks, conduit activities were small enough to withstand the losses on conduit assets, but these banks were weakened as the financial crisis continued.

In summary, we point out that an ex-ante capital requirement of 8% against conduit assets would not have been sufficient to cover all possible losses from conduits when the assets declined in value. However, the key observation is that a full capital charge would have been sufficient to discourage banks from setting up conduits in the first place.

6. Conclusion

In this paper we analyze asset-backed commercial paper conduits and show how the structure of risk-sharing in these conduits implies recourse back to bank balance-sheets. We find that outside investors who purchased asset-backed commercial paper had little loss even when collateral backing the conduits deteriorated in quality, supporting our main finding that conduits were a form of securitization without risk transfer. We also find that the stock price deterioration of banks at the start of the financial crisis was linked to the extent of their conduit exposure relative to equity capital. Once the crisis broke out, asset-backed commercial paper spreads rose and issuance fell, and more so where guarantees were weaker and sponsoring banks were weaker.

Our analysis makes it clear that from an economic standpoint conduits are "unregulated" banks that operate in the shadow banking world, but with recourse to regulated entities, mainly commercial banks, that have access to government safety net. Our results also indicate that when these unregulated banks do not have such recourse (extendible notes and SIVs), they struggle to survive a systemic crisis. While some may interpret this finding to justify the accordance of government safety net to all those parts of the shadow banking world that perform maturity mismatch like banks, the bigger lesson in our view is that the shadow banking world needs to be brought under the purview of prudential regulations.

In particular, the structure of credit guarantees to asset-backed commercial paper conduits was designed by commercial banks to arbitrage regulatory capital requirements. Such possibilities – whereby government-insured banks effectively operate at higher leverage by putting assets off-balance sheet but granting them recourse – deserve regulatory scrutiny, especially when they operate at a scale that conduits did. Regulation should either treat off-balance sheet activities with recourse as on-balance sheet for capital requirement and accounting disclosure purposes, or, require that off-balance sheet activities do not have recourse to bank balance sheets. The current treatment appears to be a recipe for disaster, from the standpoint of transparency as well as capital adequacy of the financial intermediation sector as a whole.

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Figure 1: Asset-backed Commercial Paper Outstanding

This figure shows total asset-backed commercial paper outstanding in the U.S. market from January 2001 to April 2010. The figure is based on weekly data published by the Federal Reserve Board.

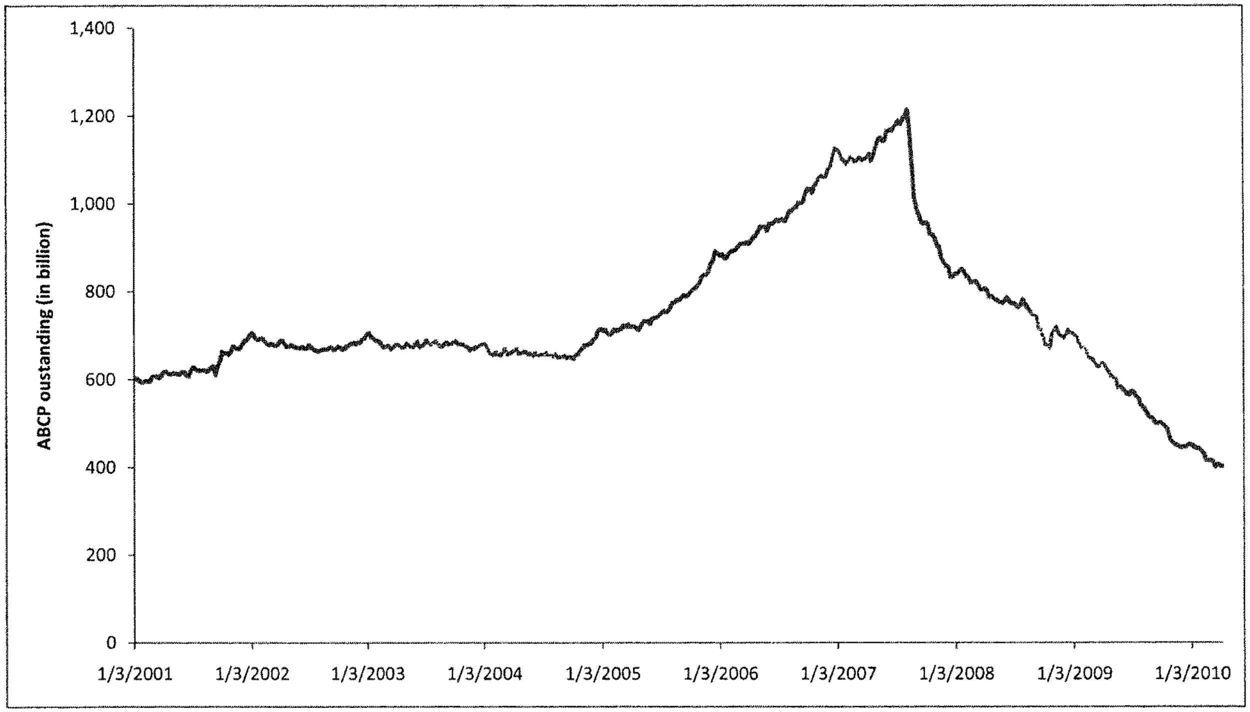


Figure 2: Asset-Backed Commercial Paper Spread

This figure shows the spread of overnight asset-backed commercial paper over the Federal Funds rate from January 2007 to August 2008. The figure is based on market data published by the Federal Reserve Board.

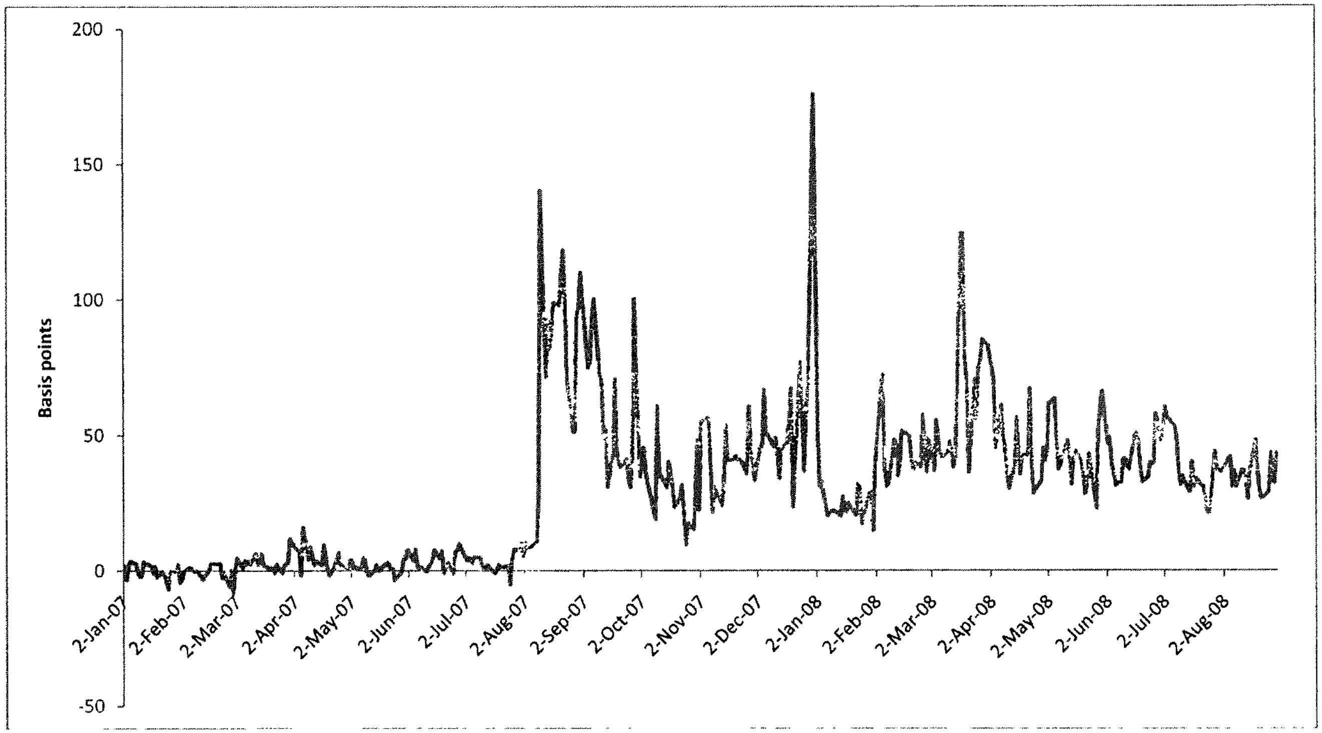


Figure 3: Conduit Structure

This figure illustrates how a conduit is related to its sponsors, outside investors, and asset sellers.

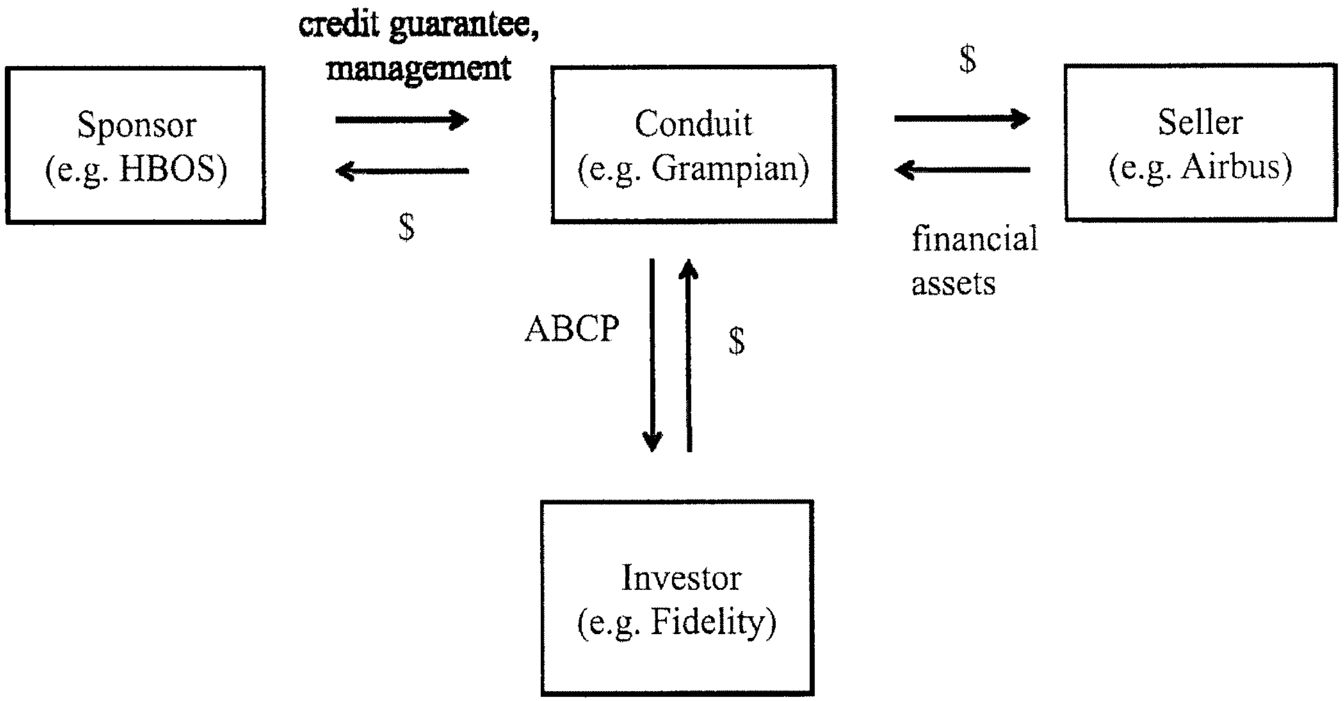
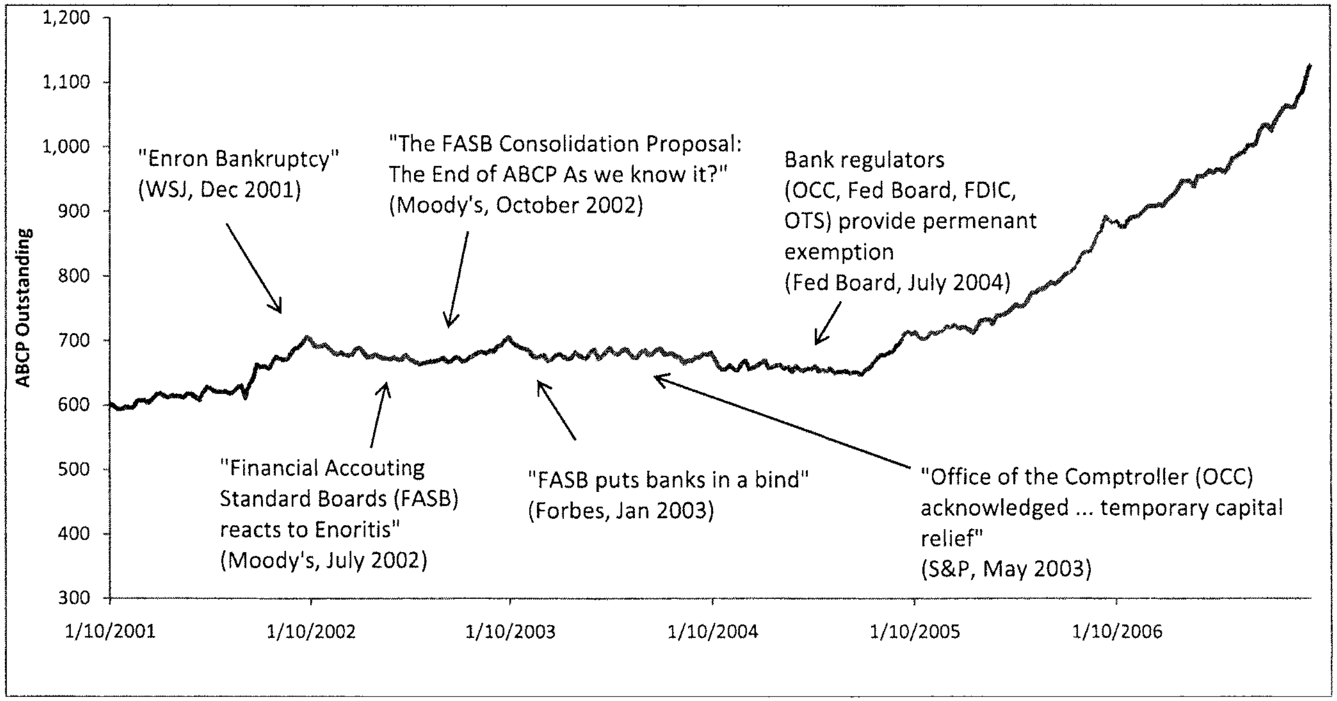


Figure 4: Capital regulation and ABCP outstanding

This figure shows total ABCP outstanding from January 2001 to December 2006. The figure also shows the timeline of regulatory decisions on regulatory capital required for guarantees provided to conduits. The references for the regulatory decisions are in the text.



"Enron Bankruptcy"
(WSJ, Dec 2001)

"The FASB Consolidation Proposal:
The End of ABCP As we know it?"
(Moody's, October 2002)

Bank regulators
(OCC, Fed Board, FDIC,
OTS) provide permenant
exemption
(Fed Board, July 2004)

"Financial Accouting
Standard Boards (FASB)
reacts to Enoritis"
(Moody's, July 2002)

"FASB puts banks in a bind"
(Forbes, Jan 2003)

"Office of the Comptroller (OCC)
acknowledged ... temporary capital
relief"
(S&P, May 2003)

Figure 5: Asset-backed Commercial Paper Outstanding by Credit Guarantee

This figure shows the natural logarithm of asset-backed commercial paper outstanding by the type of credit guarantee three months before and three months after the BNP Paribas announcement (April 11, 2007 to December 12, 2007). Asset-backed commercial paper outstanding is normalized to zero as of one day before the BNP Paribas announcement (August 8, 2009). The figure is based on weekly data from DTCC and reports from Moody's Investors Service.

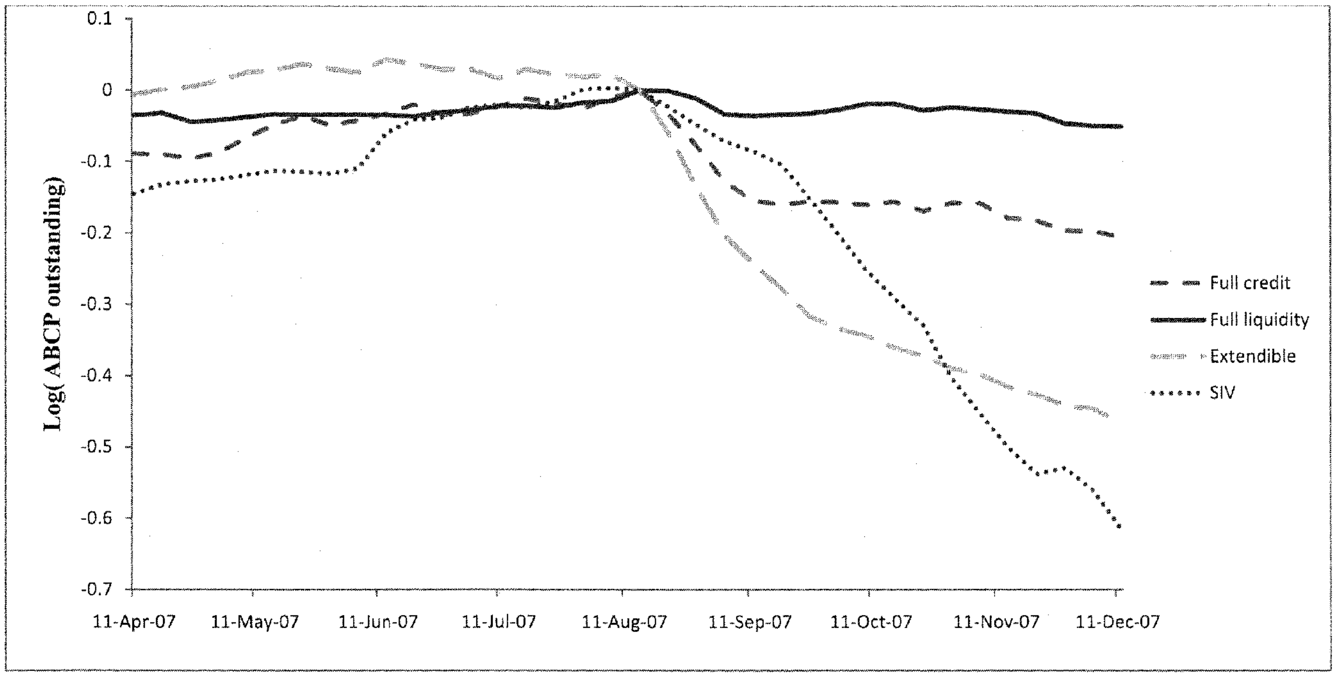


Figure 6: Asset-backed Commercial Paper Spreads by Credit Guarantee

This figure shows spreads of overnight asset-backed commercial paper over the Federal Funds rate by the type of credit guarantee three months before and three months after the BNP Paribas announcement (April 11, 2007 to December 12, 2007). The figure is based on weekly data from DTCC and reports from Moody's Investors Service.

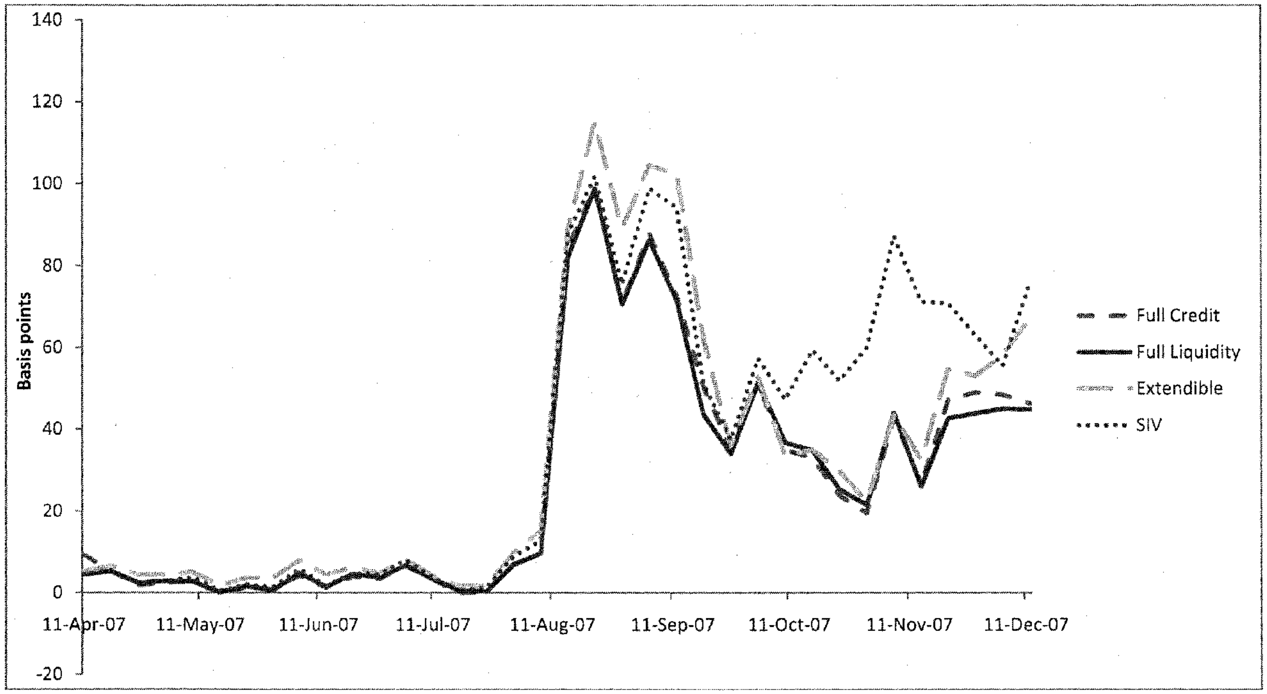


Table 1: Conduits and Sponsors

This table shows the ten largest conduits and sponsors as of 1/1/2007. The sample is restricted to bank-sponsored conduits. The information is collected from Moody's Rating Reports and Bankscope. "ABCP (bn)" denotes asset-backed commercial paper outstanding per conduit and sponsor, respectively. "Asset Origin," "Asset Rating," and "Asset Type" denote characteristics of the main asset class owned by a conduit.

Panel A: Ten Largest Conduits

Program Name	Sponsor	ABCP (bn)	Guarantee	Asset Origin	Asset Rating	Asset Type (Share %)
Grampian Funding	HBOS	37.9	Full Liquidity	United States	AAA	Residential Mortgages (36%)
Amstel Funding	ABN Amro	30.7	Full Liquidity	Netherlands	AAA	CDO/CLO (84%)
Scaldis Capital	Fortis Bank	22.6	Full Liquidity	United States	AAA	Asset backed securities (77%)
Sheffield Receivables	Barclays	21.4	Full Liquidity	n.a.	NR	Mortgages (43%)
Morrigan TRR	Hypo Public	18.9	Full Credit	n.a.	n.a.	Bonds (51%)
Cancara Asset	Lloyds	18.8	Full Liquidity	Great Britain	AAA	Residential Mortgages (43%)
Solitaire Funding	HSBC	18.5	Full Liquidity	United States	AAA	Residential Mortgages (45%)
Rhineland Funding	IKB	16.7	Full Liquidity	United States	AAA	CDO/CLO (95%)
Mane Funding	ING	13.7	Full Liquidity	n.a.	AAA	Asset backed securities (91%)
Atlantis One	Rabobank	13.5	Full Liquidity	United States	NR	Commercial Loans (100%)

Panel B: Ten Largest Sponsors

Sponsor	Country	ABCP (bn)	Assets (bn)	Tier 1 Capital (bn)	ABCP/Tier1 (%)	Tier1 Ratio (%)
Citigroup	United States	92.7	1,884.3	90.9	102.0%	8.6%
ABN Amro	Netherlands	68.6	1,300.0	31.2	219.5%	8.5%
Bank of America	United States	45.7	1,459.7	91.1	50.2%	8.6%
HBOS Plc	Great Britain	43.9	1,161.7	44.0	99.7%	8.1%
JP Morgan	United States	42.7	1,351.5	81.1	52.7%	8.7%
HSBC	Great Britain	39.4	1,860.8	87.8	44.9%	9.4%
Deutsche Bank AG	Germany	38.7	2,070.0	31.0	125.0%	8.5%
Société Générale	France	38.6	1,260.2	29.4	131.3%	7.8%
Barclays Plc	Great Britain	33.1	1,956.7	45.2	73.2%	7.7%
Rabobank	Netherlands	30.7	732.9	34.8	88.3%	10.7%

Table 2: Conduit and Sponsor Statistics

This table includes all conduits rated by Moody's Investors Service as of 1/1/2007. Panel A shows summary statistics by conduit. "Risk Transfer" refers to the guarantees provided by the sponsor. "Assets" is the main asset type as provided by Moody's Investors Service. "Currency" is the conduit's issuing currency. Panel B aggregates conduits by sponsor. "Sponsor Type" is the type of sponsoring institution. "Country of Origin" denotes the sponsor's headquarters.

Panel A: Conduits

	Total		Per Conduit	
	# Conduits	Size (bn)	Mean	Std.
All Conduits	301	1,236.2	4.1	(5.1)
Risk Transfer				
Full Liquidity	163	752.9	4.6	(5.7)
Full Credit	55	159.9	2.9	(4.6)
Extendible Notes	55	230.9	4.2	(4.5)
SIV	28	92.6	3.3	(3.4)
Assets				
Asset-backed Securities	91	387.4	4.2	(5.9)
Loans	39	65.3	1.6	(2.4)
Receivables	88	436.7	3.5	(4.9)
Mixed asset categories	59	272.9	4.6	(5.3)
Other	24	74.0	4.9	(4.7)
Currency				
U.S. Dollar	233	973.0	4.2	(4.6)
Euro	33	220.0	6.7	(8.4)
Other	35	43.2	1.2	(1.6)

Panel B: Sponsors

	Total		Per Sponsor	
	# Sponsors	Size (bn)	Mean	Std.
All Programs	127	1,236.2	9.7	(14.7)
Sponsor type				
Commercial Banks	67	911.4	13.6	(17.6)
Structured Finance	19	155.8	8.2	(13.7)
Mortgage Lender	18	75.5	4.2	(5.8)
Investment Manager	5	17.6	3.5	(3.3)
Investment Banks	4	11.0	2.7	(2.2)
Other	14	64.8	4.6	(6.2)
Country of Origin				
United States	67	491.8	7.3	(14.7)
Germany	15	204.1	13.6	(11.6)
United Kingdom	10	195.7	19.6	(17.0)
Other	35	344.5	9.8	(14.4)

Table 3: Asset-backed Commercial Paper by Sponsor Type and Guarantee

This table includes all conduits that were rated by Moody's Investors Service as of 1/1/2007. The 'Total' shows total asset-backed commercial paper outstanding as of 1/1/2007 per type of sponsor. The 'Guarantee' shows the breakdown of asset-backed commercial paper by type of credit guarantee.

	Total		Guarantee			
	# Sponsors	Size (bn)	Full Liquidity	Full Credit	Extendible	SIV
Commercial Banks	64	911.4	74.2%	10.9%	8.6%	6.3%
Structured Finance	19	155.8	7.0%	37.2%	34.7%	21.1%
Mortgage Lender	18	75.5	14.3%	0.0%	82.8%	2.9%
Investment Manager	5	17.6	0.0%	1.3%	98.7%	0.0%
Investment Banks	4	11.0	54.9%	0.0%	45.1%	0.0%
Other	14	64.8	74.8%	2.3%	22.9%	0.0%

Table 4: Conduits and Sponsor Statistics by Guarantee

This table reports the breakdown of asset-backed commercial paper (ABCP) outstanding by type of guarantee, sponsor, and main asset holdings for all conduits that were rated by Moody's Investors Service as of 1/1/2007. The column 'Total' shows total ABCP outstanding in dollars as of 1/1/2007 per type of guarantee: Full Liquidity, Full Credit, Extendibles, and Structured Investment Vehicles (SIVs). The column 'Spreads' shows the mean spread of overnight asset-backed commercial paper over the Fed funds rate in percentage points in the period from 1/1/2007 to 8/1/2007 per type of guarantee. The standard deviation is below in brackets. The column 'Sponsor' reports, for each type of guarantee, the percent of ABCP outstanding by type of sponsor: Banks, Structured Finance groups (SF), Mortgage Finance companies, and Other. The column 'Asset' reports, for each type of guarantee, the breakdown of ABCP outstanding by asset type: Asset-Backed Securities, Loans, Receivables, Mix of the previous categories, and Other.

Guarantee	Total (bn)	Spread (%)	Sponsor	%	Asset	%
Full Liquidity	752.9	0.010	Banks	89.9%	Asset-backed securities	29.2%
		(0.091)	SF	1.5%	Loans	3.7%
			Mortgage	1.4%	Mix	20.8%
			Other	7.2%	Other	3.6%
					Receivables	42.6%
Full Credit	159.9	0.025	Banks	62.4%	Asset-backed securities	10.2%
		(0.155)	SF	36.5%	Loans	0.5%
			Mortgage	1.1%	Mix	39.4%
			Other	0.0%	Other	11.9%
					Receivables	37.9%
Extendibles	230.9	0.017	Banks	33.8%	Asset-backed securities	28.8%
		(0.081)	SF	23.6%	Loans	15.6%
			Mortgage	27.1%	Mix	23.0%
			Other	15.6%	Other	8.5%
					Receivables	24.0%
SIV	92.6	0.022	Banks	61.8%	Asset-backed securities	91.3%
		(0.040)	SF	34.5%	Loans	8.7%
			Mortgage	2.4%	Mix	0.0%
			Other	1.4%	Other	0.0%
					Receivables	0.0%

Table 5: Effect of Guarantee on Asset-Backed Commercial Paper Outstanding

This table shows the effect of credit guarantees on asset-backed commercial paper outstanding. The sample covers the period April to December 2007. The dependent variable is the log of paper outstanding measured in millions of dollars at a weekly frequency. "Full Credit," "Extendible Notes," and" SIV" are indicator variables for the type of credit guarantee. The indicator variable "After" denotes dates after the crisis starting on August 9, 2007. "Receivables" ("Loans") is an indicator for variable conduits that report to Moody's Investors Service that the main type of asset in their portfolio are receivables (loans). Columns (4) to (8) include dummies for main type of asset type (Asset-Backed Securities (the omitted category), Loans, Receivables, Mix of the previous types, and Other) and their interaction with the "After" indicator. For compactness, we report the coefficient on "Receivables" and "Loans" only. Standard errors in brackets are clustered at the conduit level. * significant at 10%; ** significant at 5%; *** significant at 1%

	Log(ABCP outstanding)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Full Credit*After	-0.068	-0.062	0.061	-0.005	-0.026	-0.016	0.065	0.023
	(0.124)	(0.125)	(0.130)	(0.202)	(0.132)	(0.134)	(0.135)	(0.212)
Extendible*After	-0.725***	-0.748***	-0.880***	-0.681*	-0.750***	-0.775***	-0.818***	-0.683*
	(0.201)	(0.204)	(0.200)	(0.404)	(0.198)	(0.201)	(0.201)	(0.404)
SIV*After	-0.697***	-0.694***	-0.563***	-0.454	-0.575***	-0.570***	-0.451**	-0.391
	(0.156)	(0.157)	(0.157)	(0.290)	(0.168)	(0.169)	(0.176)	(0.330)
Receivables*After					0.179	0.184	0.198	0.211
					(0.175)	(0.174)	(0.155)	(0.244)
Loans*After					-0.742**	-0.789**	-0.556*	-0.507*
					(0.304)	(0.310)	(0.284)	(0.293)
After	-0.213**				-0.144			
	(0.084)				(0.158)			
Observations	7630	7630	7630	7630	7630	7630	7630	7630
R-squared	0.053	0.057	0.849	0.937	0.156	0.162	0.853	0.938
Time-fixed effects?	No	Yes	Yes	No	No	Yes	Yes	No
Sponsor-time-fixed effects?	No	No	No	Yes	No	No	No	Yes
Conduit-fixed effects?	No	No	Yes	Yes	No	No	Yes	Yes

Table 6: Effect of Sponsor Risk on Asset-Backed Commercial Paper Outstanding

This table shows the effect of sponsor risk on asset-backed commercial paper outstanding. The sample covers the period April to December 2007. The dependent variable is the log of paper outstanding measured in millions of dollars at a weekly frequency. "Full Credit," "Extendible Notes," and" SIV" are indicator variables for the type of credit guarantee. The indicator variable "After" denotes dates after the crisis starting in August 9, 2007. "CDS" is the CDS Spread of the sponsor. Columns (4) to (8) include all two-way interactions of "Sponsor CDS". Standard errors in brackets are clustered at the conduit level. * significant at 10%; ** significant at 5%; *** significant at 1%

	Log(ABCP outstanding)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Full Credit*After	0.032	0.036	0.068	0.037	-0.483	-0.598	-0.144	-0.147
	(0.151)	(0.152)	(0.148)	(0.211)	(0.418)	(0.432)	(0.222)	(0.294)
Extendible*After	-0.665*	-0.705**	-0.856**	-0.438	-0.464	-0.476	-0.525	-1.275*
	(0.345)	(0.356)	(0.385)	(0.438)	(0.424)	(0.433)	(0.456)	(0.746)
SIV*After	-0.577**	-0.576**	-0.489**	-0.535	-0.108	-0.174	0.233	0.19
	(0.222)	(0.224)	(0.229)	(0.336)	(0.497)	(0.486)	(0.511)	(0.724)
CDS*Full Credit*After					2.024*	2.267*	0.483	0.537
					(1.079)	(1.154)	(0.437)	(0.628)
CDS*Extendible*After					-0.983*	-1.032**	-0.529	3.023
					(0.510)	(0.510)	(0.358)	(1.737)
CDS*SIV*After					-1.733	-1.611	-1.569	-1.842
					(1.109)	(1.108)	(1.159)	(1.500)
After	-0.270***				-0.282			
	(0.085)				(0.172)			
Time-fixed effects?	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Conduit-fixed effects?	No	No	Yes	Yes	No	No	Yes	Yes
Sponsor-time fixed effects	No	No	No	Yes	No	No	No	Yes
Observations	4,448	4,448	4,448	4448	4,448	4,448	4,448	4,448
R-squared	0.141	0.147	0.844	0.909	0.153	0.362	0.849	0.912

Table 7: Effect of Guarantee on Overnight Asset-Backed Commercial Paper Spreads

This table shows the effect of guarantees on asset-backed commercial paper spreads. The sample covers the period April to December 2007. The dependent variable is the overnight asset-backed commercial paper spread over the Fed Funds rate in the primary market measured daily. The explanatory variables are defined the same way as in Table 5. Columns (4) to (8) include dummies for main type of asset type (Asset-Backed Securities (the omitted category), Loans, Receivables, Mix of the previous types, and Other) and their interaction with the "After" indicator. For compactness, we report the coefficient on "Receivables" and "Loans" only.. Standard errors shown are clustered at the conduit level. * significant at 10%; ** significant at 5%; *** significant at 1%

	Spread							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Full Credit*After	0.023	0.025	0.041	-0.004	-0.007	-0.004	-0.015	-0.1
	(0.055)	(0.055)	(0.058)	(0.103)	(0.054)	(0.054)	(0.054)	(0.077)
Extendible*After	0.129**	0.093**	0.135***	0.068	0.047	0.013	0.021	-0.119
	(0.054)	(0.047)	(0.050)	(0.110)	(0.063)	(0.057)	(0.061)	(0.214)
SIV*After	0.316***	0.254***	0.260***	0.315**	0.244**	0.196**	0.166	0.245**
	(0.099)	(0.082)	(0.093)	(0.132)	(0.108)	(0.091)	(0.109)	(0.107)
Loan*After					0.216	0.215	0.122	0.437***
					(0.165)	(0.165)	(0.172)	(0.105)
Receivables*After					-0.142*	-0.128	-0.164**	-0.162
					(0.076)	(0.079)	(0.077)	(0.106)
After	0.474***				0.484***			
	(0.026)				(0.072)			
Observations	14,862	14,862	14,862	14,862	14,862	14,862	14,862	14,862
R-squared	0.444	0.717	0.843	0.952	0.493	0.766	0.865	0.960
Time-fixed effects?	No	Yes	Yes	No	No	Yes	Yes	No
Sponsor-time-fixed effects?	No	No	No	Yes	No	No	No	Yes
Conduit-fixed effects?	No	No	Yes	Yes	No	No	Yes	Yes

Table 8: Effect of Sponsor Risk on Overnight Asset-Backed Commercial Paper Spreads

This table shows the effect of credit guarantees on asset-backed commercial paper spreads. The sample covers the period April to December 2007. The dependent variable is the asset-backed commercial paper spread on overnight commercial paper in the primary market measured daily. The explanatory variables are defined the same way as in Table 6. Columns (4) to (8) include all two-way interactions of "Sponsor CDS". Standard errors shown are clustered at the conduit level. * significant at 10%; ** significant at 5%; *** significant at 1%

	Overnight spread							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Full Credit*After	-0.098	-0.1	-0.038	-0.074	-0.03	-0.088	-0.05	-0.105
	(0.073)	(0.072)	(0.072)	(0.123)	(0.082)	(0.095)	(0.081)	(0.111)
Extendible*After	0.191	0.083	0.215**	0.186	-0.216***	-0.190***	0.016	0.26
	(0.127)	(0.089)	(0.108)	(0.148)	(0.059)	(0.051)	(0.262)	(0.434)
SIV*After	0.205*	0.163*	0.182**	0.305***	0.389***	0.256*	0.280**	0.410***
	(0.112)	(0.087)	(0.091)	(0.114)	(0.141)	(0.152)	(0.115)	(0.137)
CDS*Full Credit*After	0.466***				-0.240*	-0.016	0.054	0.229
	(0.032)				(0.122)	(0.117)	(0.180)	(0.200)
CDS*Extendible*After					0.823***	0.550***	0.328	-0.3
					(0.192)	(0.072)	(0.319)	(0.731)
CDS*SIV* After					-0.572	-0.268	-0.273	-0.254
					(0.394)	(0.320)	(0.259)	(0.263)
After	-0.270***				0.471***			
	(0.085)				(0.035)			
Time-fixed effects?	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Conduit-fixed effects?	No	No	Yes	Yes	No	No	Yes	Yes
Sponsor-time fixed effects	No	No	No	Yes	No	No	No	Yes
Observations	9510	9510	9510	9510	9510	9510	9510	9510
R-squared	0.401	0.676	0.839	0.932	0.408	0.68	0.84	0.932

Table 9: Estimated Losses for Sponsors and Outside Investors

This table shows the ex-post risk transfer by credit guarantee. "Pre-crisis" denotes total asset-backed commercial paper outstanding as of 7/1/2007. Post-crisis denotes the value-weighted share that is "Active" (conduit continues to issue), "Repaid" (conduit closed and repaid investors), and "In Default" (Conduit closed and investor not repaid). "Estimated losses" estimates the losses of sponsor and outside investors assuming a recovery rate on conduit assets of 95% and 85%, respectively.

	Pre-Crisis	Post-Crisis			Estimated Loss (bn)			
					Loss rate: 5%		Loss rate 15%	
	ABCP (bn)	Active	Repaid	In Default	Sponsor	Investor	Sponsor	Investor
All	1,395.50	76.60%	20.80%	2.50%	68.0	1.7	204.1	5.2
Risk Transfer					0.0	0.0	0.0	0.0
Full Liquidity	844	87.90%	12.10%	0.00%	42.2	0.0	126.6	0.0
Full Credit	204.2	70.90%	29.10%	0.00%	10.2	0.0	30.6	0.0
Extendibles	243.1	47.00%	45.50%	7.40%	11.3	0.9	33.8	2.7
SIV	104.1	65.70%	17.70%	16.60%	4.3	0.9	13.0	2.6
Sponsor Type					0.0	0.0	0.0	0.0
Commercial Bank	1,035.60	83.00%	16.40%	0.60%	51.5	0.3	154.4	0.9
Structured Finance	199.2	58.10%	36.40%	5.50%	9.4	0.5	28.2	1.6
Mortgage Lender	60.2	44.50%	40.20%	15.30%	2.5	0.5	7.6	1.4
Other	100.4	63.30%	24.40%	8.90%	4.6	0.4	13.7	1.3

Table 10: Event Study Summary Statistics

This table shows summary statistics by conduit exposure. We sort banks in three groups: bank with no conduit exposure, banks with low conduit exposure, and banks with high conduit exposure. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions, (ii) are located in the Europe or the United States, and (iii) have share price data available. We measure 'Stock Return' as the total stock return in the three-day window from August 8,2007, to August 10, 2007, 'Exposure' is the asset-backed commercial paper outstanding relative to equity, 'Log Assets' is the natural logarithm of assets, 'Log Equity' is the natural logarithm of equity, 'Equity Ratio' is equity as share of assets, 'Share Deposits' is deposits as share of assets, and 'Share Short-Term Debt' is short-term debt as share of assets. All variables are measured as of January 1, 2007. 'United States' is an indicator variable whether a bank is headquartered in the United States.

			Conduit Exposure	
Sample:	All (1)	No (2)	Low (3)	High (4)
Stock return Aug 8th - Aug 10th	-0.004	0.007	-0.028	-0.046
	(0.052)	(0.055)	(0.024)	(0.026)
Conduit Exposure	0.169	0.000	0.248	1.199
	(0.532)	0.000	(0.131)	(1.155)
Log(Assets)	3.961	3.154	6.379	6.325
	(2.284)	(1.987)	(1.077)	(1.280)
Log(Equity)	1.355	0.670	3.671	3.025
	(2.043)	(1.832)	(0.877)	(1.161)
Equity Ratio	0.091	0.101	0.076	0.043
	(0.099)	(0.111)	(0.038)	(0.026)
Share Deposits	0.602	0.63	0.530	0.504
	(0.208)	(0.223)	(0.112)	(0.145)
Share Short-Term Debt	0.073	0.050	0.122	0.167
	(0.084)	(0.050)	(0.117)	(0.129)
US Indicator Variable	0.542	0.613	0.400	0.250
	(0.501)	(0.490)	(0.507)	(0.452)
N	107	80	15	12

Table 11: Effect of Conduit Exposure on Stock Returns (August 8, 2007 – August 10, 2007)

This table shows the effect of conduit exposure on stock return. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return over the three-day period from August 8, 2007 to August 10, 2007. We measure 'Conduit Exposure' as asset-backed commercial paper relative to equity. Columns (2) to (6) include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity). All control variables are measured as of January 1, 2007. Column (6) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Stock Return					
	(1)	(2)	(3)	(4)	(5)	(6)
Conduit Exposure	-0.026	-0.014	-0.011	-0.013	-0.014	-0.015
	(0.007)**	(0.004)**	(0.003)**	(0.003)**	(0.003)**	(0.004)**
Log(Assets)		-0.007	-0.022	-0.024	-0.027	0.005
		(0.005)	(0.008)**	(0.008)**	(0.009)**	-0.015
Log(Equity)		-0.004	0.012	0.013	0.015	-0.016
		(0.007)	(0.009)	(0.009)	(0.009)	(0.015)
Equity-Assets Ratio			-0.099	-0.103	-0.137	-0.006
			(0.029)**	(0.031)**	(0.037)**	(0.065)
Share Short Term Debt				0.066	0.063	0.039
				(0.041)	(0.041)	(0.042)
Share Deposits					-0.027	-0.017
					(0.017)	(0.026)
Constant	0.000	0.033	0.079	0.082	0.111	0.036
	(0.005)	(0.015)*	(0.025)**	(0.026)**	(0.032)**	(0.042)
Country FE	N	N	N	N	N	Y
Observations	107	107	107	107	107	107
R-squared	0.068	0.277	0.289	0.297	0.303	0.359

Table 12: Conduit Exposure and Stock Return in Months before Start of Financial Crisis (January to August 2007)

This table shows the effect of conduit exposure on stock return in the months before the start of the financial crisis. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions, (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return for the month indicated at the top of each column. We measure 'Conduit Exposure' as bank-sponsored ABCP outstanding relative to equity. All columns include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets), and log(Equity), and geographic controls. All control variables are measures on 1/1/2007. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Stock Return							
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exposure	0.008	-0.006	0.003	-0.005	0.004	0.006	0.014	-0.029
	(0.012)	(0.005)	(0.005)	(0.009)	(0.010)	(0.008)	(0.011)	(0.009)**
Log(Assets)	-0.026	-0.03	-0.033	-0.005	-0.042	-0.012	-0.037	-0.006
	(0.024)	(0.018)	(0.023)	(0.024)	(0.021)	(0.021)	(0.032)	(0.025)
Log(Equity)	0.033	0.031	0.029	0.02	0.043	0.01	0.043	-0.002
	(0.024)	(0.018)	(0.024)	(0.023)	(0.021)*	(0.022)	(0.031)	(0.026)
Equity-Assets Ratio	-0.058	-0.117	-0.134	0.016	-0.2	0.105	-0.098	-0.058
	(0.120)	(0.082)	(0.099)	(0.112)	(0.110)	(0.078)	(0.172)	(0.115)
Share Short Term Debt	-0.036	-0.081	0.096	0.078	-0.064	0.064	0.012	0.029
	(0.044)	(0.041)	(0.050)	(0.072)	(0.090)	(0.048)	(0.071)	(0.106)
Share Deposits	-0.053	-0.013	-0.005	-0.021	-0.055	0.071	0.057	0.008
	(0.036)	(0.028)	(0.035)	(0.046)	(0.052)	(0.056)	(0.086)	(0.052)
Constant	0.08	0.092	0.168	0.04	0.149	-0.077	0.082	0.009
	(0.067)	(0.051)	(0.059)**	(0.066)	(0.059)*	(0.050)	(0.092)	(0.068)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	107	107	107	107	107	107	107	107
R-squared	0.648	0.337	0.376	0.522	0.301	0.196	0.295	0.258

Table 13: Missing Capital

This table lists the 30 largest banks sponsors of ABCP as of 1/1/2007. For each bank, we compute the required capital assuming ABCP requires a capital charge of 8%, i.e. ABCP*0.08=Total, expressed in billions of US dollars.. We also compute the 'missing capital' as a share of a bank's equity. We measure equity as Tier 1 Capital. If a bank does not report Tier 1 Capital, we multiply shareholder equity with the average Tier 1/equity shareholder ratio of banks that report both shareholder equity and Tier 1 ratio.

			Missing Capital	
Name	Tier 1	ABCP	Total	%
Citigroup Inc	90.9	92.672	7.4	8.2%
ABN Amro Holding NV	31.2	68.575	5.5	17.6%
Bank of America Corporation	91.1	45.691	3.7	4.0%
HBOS Plc	44.0	43.9	3.5	8.0%
JP Morgan Chase & Co.	81.1	42.714	3.4	4.2%
HSBC Holdings Plc	87.8	39.426	3.2	3.6%
Deutsche Bank AG	31.0	38.736	3.1	10.0%
Société Générale	29.4	38.639	3.1	10.5%
Barclays Plc	45.2	33.07	2.6	5.9%
Mitsubishi UFJ Financial Group	68.5	32	2.6	3.7%
Rabobank Nederland	34.8	30.773	2.5	7.1%
WestLB AG	9.5	29.946	2.4	25.1%
ING Groep NV	54.3	26.417	2.1	3.9%
Dresdner Bank AG	18.7	23.191	1.9	9.9%
Fortis	16.4	22.596	1.8	11.0%
Bayerische Landesbank	15.8	22.352	1.8	11.3%
Bayerische Hypo-und Vereinsbank AG	14.1	22.263	1.8	12.6%
State Street Corporation	24.1	21.855	1.7	7.2%
Crédit Agricole S.A.	6.5	19.48	1.6	24.1%
Hypo Real Estate Holding AG	4.5	18.931	1.5	33.4%
Lloyds Banking Group Plc	6.1	18.782	1.5	24.6%
Countrywide Financial Corporation	25.2	18.305	1.5	5.8%
GMAC LLC	15.4	17.539	1.4	9.1%
Royal Bank of Scotland	75.2	15.847	1.3	1.7%
Royal Bank of Canada RBC	52.3	15.602	1.2	2.4%
Bear Stearns Companies LLC	19.1	13.845	1.1	5.8%
KBC Group	22.9	12.606	1.0	4.4%
Sachsen Landesbank	1.3	12.528	1.0	79.9%
BNP Paribas	62.3	11.647	0.9	1.5%
Bank of Montreal	45.3	11.528	0.9	2.0%
Total	1,124.0	861.5	68.9	6.1%

MANUFACTURING TAIL RISK:

A PERSPECTIVE ON THE FINANCIAL CRISIS OF 2007-09

Viral V. Acharya, Thomas Cooley, Matthew Richardson and Ingo Walter[1]

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ABSTRACT: *We argue that the fundamental cause of the financial crisis of 2007-09 was that large, complex financial institutions ("LCFIs") took excessive leverage in the form of manufacturing tail risks that were systemic in nature and inadequately capitalized. We employ a set of headline facts about the build-up of such risk exposures to explain how and why LCFIs adopted this new banking model during 2003-2Q 2007, relative to earlier models. We compare the crisis to other episodes in the United States, in particular, the panic of 1907, the failure of Continental Illinois and the Savings and Loan crisis. We conclude that several principal imperfections, in particular, distortions induced by regulation and government guarantees, developed in decades preceding the current one, allowing LCFIs to take on excessive systemic risk. We also examine alternative explanations for the financial crisis. We conclude that while moral hazard problems in the originate-and-distribute model of banking, excess liquidity due to global imbalances and mispricing of risk due to behavioral biases have some merit as candidates, they fail to explain the complete spectrum of evidence on the crisis.*

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I. INTRODUCTION

There is virtually universal agreement that the fundamental cause of the global economic and financial crisis of 2007-09 was the combination of a credit boom and a housing bubble. In the five-year period covering 2002-2007, the ratio of debt to national income in the United States increased from 3.75 : 1 to 4.75 : 1. It had taken the whole preceding decade to produce an increase in aggregate debt of this magnitude. Moreover, from 2002 to 2007, house prices grew at an unprecedented rate of 11 percent per year. Why? With the benefit of hindsight, an extraordinary flood of liquidity and accommodative monetary policy that ignored asset prices produced extraordinarily low expected real interest rates. This appeared to have left investors scrambling for "alpha" – the so-called "search for yield" – that encouraged all kinds of borrowers to use maximum leverage. Households, corporations, financial firms, investors, and even countries borrowed heavily. When the "bubble" burst, a severe economic crisis was bound to come. At the household level, families whose homes were highly leveraged and whose equity represented 35 percent of their wealth would not be able to consume as they did through 2007. The real economy was bound to feel the brunt of the inevitable correction.

It is much less clear, however, why this combination of events led to such a severe financial crisis -- why we had such widespread and sometimes catastrophic failures of financial institutions along with the freezing-up of capital markets. The systemic crisis that ensued reduced the supply of capital to creditworthy institutions and individuals, resulted in a sudden sharp decline in global trade and production, and amplified the effects on the real economy worldwide.

We argue that what made the this economic shock unique, and led to such a severe financial crisis was the behavior of many of the large, complex financial institutions (LCFIs) — the universal banks and financial conglomerates, investment banks, insurance companies, and (in rare cases) even hedge funds — that today dominate the financial industry. These LCFIs ignored their own business model of securitization and chose *not* to transfer credit risk to other investors. Instead, they employed securitization to manufacture and retain tail risk that was systemic in nature and inadequately capitalized. Institutions matter, and in this case the robustness of the financial architecture built over two decades or so showed severe weaknesses.

The legitimate and valuable purpose of securitization is to spread risk. It does so by removing large concentrations of risk from the balance sheets of financial institutions, and placing small concentrations into the hands of a large number of investors who get paid an acceptable price for bearing that risk. But especially from 2003 to 2007, the main purpose of securitization appeared not to have been to share risks with investors, but to make an end-run around capital-adequacy regulations applied to financial intermediaries. The net result was to keep the risk concentrated in the financial institutions themselves — and, indeed, to keep that risk at a greatly magnified level because of the overleveraging that it allowed. When the risk actually materialized – the housing bubble burst – these institutions experienced wholesale failures, resulting in the greatest systemic crisis we have seen since the Great Depression.

Our assessment can be restated in a different way. It is now well recognized that given limited liability, levered firms have incentives to shift the profile of their assets towards higher risk (the so-called "risk-shifting" argument of Jensen and Meckling, 1976). Left to market devices, agency costs arising due to these incentives should be priced by creditors. In turn, the firms should have incentives to limit agency costs *ex ante*. In this view, all outcomes are assumed to be second best in equilibrium. However, this view needs to be refined for financial firms, since they have an important set of creditors - the government and the taxpayer - as a consequence of implicit and explicit subsidies. Government guarantees are often not priced fully (or at all). This distorts financial firms' cost of capital and their capital budgeting, inducing a preference for higher risk and higher leverage. Recognizing this moral hazard problem, regulation such as capital requirements are put in place.

As a result, the objective function of financial firms can be viewed as maximizing shareholder value given the mis-pricing of agency costs in government guarantees and subject to capital adequacy requirements. While these firms can maximize their objective functions by enhancing overall value, that is, taking positive net present value investments, they can also circumvent capital requirements if regulation is lax and the resulting "regulatory arbitrage" is opaque and complex enough that markets cannot fully price the resulting agency costs. Viewed in this perspective, LCFI behavior during 2003-07 clearly shows profit maximization by extensively exploiting gaps in the regulatory constraint rather than by undertaking positive net present value investments. The end result was the classic excessive leverage build-up in the financial sector. But since the manner in which such gaps were exploited was complex and opaque, the crisis that resulted was not well-anticipated by markets and led to severe spillovers to both financial and real sectors of the economy.

Section II of this paper begins with a brief history of how the U.S. financial system evolved into its current form. We pay special attention to the risk-taking incentives of financial institutions and the breakdown of the regulatory system-wide protections that had emanated from the experience of the Great Depression.

Section III proposes a set of headline facts about the precise manner in which banks built tail (systemic) risk exposures during 2003-2Q 2007 in large measure to get around capital requirements, in contrast to their earlier business models. We explain how lax regulation contributed to these outcomes, especially during the 2003-05 period.

In light of these headline facts, Section IV examines alternative explanations for the financial crisis: (1) Failure of the originate-and-distribute model, and the role played by rating agencies; (2) Panics in response to efficient securitization undertaken by the financial sector; (3) Global imbalances; (4) "Animal spirits" and mispricing of risks; (5) Loose monetary policy, especially in the United States; and, (6) Illiquidity-induced crisis (rather than an insolvency-induced one). By and large, we conclude that global imbalances and loose monetary policy were relevant proximate contributors to the crisis by producing an asset-price bubble in the United States that ultimately led to the large negative economic shock; concomitantly, the contemporaneous business model of LCFIs to concentrate tail risks on their balance-sheets rather than distribute them translated the economic shock into a full-blown crisis in the financial sector which was soon transferred to the real sector. We explain why none of the other alternative explanations does much to help explain the complete spectrum of available evidence on risks undertaken by banks.

Section V provides concluding remarks and a brief discussion of possible remedies to charge banks for manufacturing tail risks and to contain such propensity in the first place. Though we focus on the United States for most of our discussion, we also discuss risk-taking and realized losses by LCFIs in other parts of the world. This latter discussion is contained in Section IV, where we consider the role of global imbalances, and in a separate Appendix.

II. HOW DID WE GET THERE?

Financial crises have many common features. Preceding any crisis, there is almost invariably some sort of asset price bubble, a corresponding credit boom, and large capital inflows into the economy (see, for example, Reinhart and Rogoff (2008)). This is not too surprising. A financial crisis by definition involves a precipitous drop in nominal wealth and an increase in volatility, which widen credit spreads. That said, it remains likely that, while these characteristics are necessary, they are not sufficient to define a true financial crisis. Its severity fundamentally depends on the underlying financial sector's exposure to such conditions together with the overall market's uncertainty about the financial sector's exposure to the developments at hand.

This section maps out how the U.S. financial system got to the point at which the crisis of 2007-2009 emerged. We begin a century earlier, with the panic of 1907.

A. The Panic of 1907 and Its Aftermath

The panic of 1907 was triggered in the curbside "shadow" stock market that was organized outside the New York Stock Exchange (NYSE).[2] Many companies were traded literally on the street curb in a vibrant market that eventually became the American Stock Exchange. Why? Because the market was more efficient and more accessible than the NYSE at the time. In October of 1907, two brothers, Augustus and Otto Heinze, tried to corner the market in United Copper Company stock by executing a short squeeze. Their scheme failed, and the price of United Copper plummeted. The Heinze brothers who had hatched the scheme turned out to have been heavily involved with a number of banks and brokerages. When their curb market scheme collapsed, it quickly raised concerns about the safety of the banks that had lent the money to back their scheme. Within days a state bank in Montana owned by Augustus Heinze failed. Augustus was also President of the Mercantile National Bank of New York at the time, and was forced to resign because of his association with the corner and the failed Montana Bank. News of his resignation immediately created a panic that caused a run on the Mercantile Bank.

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[2] The best recent account of the Panic of 1907 is Bruner and Carr (2007).

The panic spread and led to pressure on other banks' stocks and deposits in those banks – a classic case of contagion. Noteworthy was the Knickerbocker Trust Co., the third largest trust bank in New York, whose President Charles Barney was suspected of having helped to finance the Heinze scheme. The run on the Knickerbocker Trust Co. forced it to close its doors and suspend operations. Charles Barney committed suicide not long after. The panic continued to spread to other trust companies and, within days, a large number of banks had failed.

The problem that faced banks - and financial markets more broadly at the time - was the contradiction inherent in fractional reserve banking. All such institutions were engaged in intermediation of one form or another with less than 100% reserves. When depositors became concerned and demanded their money back, even solvent financial institutions could find their cash and gold reserves insufficient to meet demands for cash and were forced to shut their doors. The institutions that had evolved (see Gorton, 1985) to address the problem of temporary liquidity shortages were bank clearing house associations that pooled resources to provide liquidity to individual members in times of stress and perform many of the functions of a central bank. But two problems emerged in this arrangement during the Panic of 1907. The first was that a private clearinghouse association can itself face the risk of default. The second was that trust companies in New York were excluded from membership in the banks' Clearing House Association.

Some calm was restored during the 1907 panic by the intervention of J.P. Morgan, who assumed a central role in trying to prevent it from spreading. Morgan had examined the books of the Knickerbocker Trust and concluded it was insolvent and had to be closed. When the panic spread to the Trust Company of America it too turned to Morgan for help. He and his associates concluded that the bank was indeed solvent, but would need a great deal of liquidity to survive. Morgan met with other bankers, the Secretary of the Treasury and John D. Rockefeller, and convinced them to work together to stop the panic.

The joint effort turned out to be successful in the short run. Morgan had temporarily saved the day, but that was not the end of his intervention. Short-term loans were unavailable. Call money rates soared to 60% and more, and no loans took place. The troubles of the banks spread to the stock exchange, which lost 48% of its value in a matter of weeks. Many prominent brokerages were threatened with collapse. New York City was on the verge of bankruptcy. And, within a short time the Trust Companies themselves were again on the verge of collapse. J.P. Morgan invited the most prominent banking and trust company leaders to a meeting at his home and, famously, locked them in the library until they agreed to a plan to help the weakest of their members through the crisis.

There were many lessons to be learned from the Panic of 1907, most notably concerning liquidity and capital, which would play out over the next quarter century and remained trenchant a hundred years later. On the liquidity front, it became accepted that there needed to be a credible lender of last resort who can restore trust in the system and its institutions. And on the capital front, it was realized that since information regarding solvency of financial institutions is difficult to gather and incredibly valuable, if there is no institution to provide it, the risk of bank runs is high.

Essentially starting with the Panic of 1907 and carrying through the banking crisis of August 1914, the stock market crash of 1929, and the banking panics of 1930, 1931 and early 1933, what emerged was a complete overhaul of the U.S. financial system. While the Federal Reserve - and its role as the lender of last resort - was created in 1913, the majority of the changes were enacted in 1933 and 1934.[3] These regulatory initiatives were enacted precisely because policymakers recognized that the severity of the banking crisis and the ensuing period, commonly referred to as the Great Depression, were inexorably inter-related.

Specifically, the 1929 stock market crash, the collapse of production and wealth that followed, and the continued volatility of financial markets in the 1930s, led consumers and businesses to dramatically reduce spending, caused extraordinarily high bankruptcy rates among businesses, and brought about the disappearance by failure or acquisition of nearly half of all American financial institutions, often involving classis bank runs triggered by suspected insolvency. These came in the form of three separate waves of banking panics during 1930-33. The economic forces that created and perpetuated the Great Depression have been much discussed and debated, and we will simply note here a general consensus that the contractionary monetary policies that the Federal Reserve Board pursued at the time were a contributory factor in the banking crises and their real-sector consequences (Friedman and Schwartz, 1971). Prices of goods and services fell approximately 25 percent between 1929 and 1933. This in turn led to debt deflation, a phenomenon by which the collateral underlying loans shrinks in value, causing the real burden of debt to rise, leading the economy to spiral further downward (Bernanke, 2000).

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[3] Friedman and Schwartz (1971) and Meltzer (2004).

Policymakers at the time recognized that, even with the liquidity backstop by the government, the problem with the U.S. financial system was that uncertainty about insolvency (i.e., bank capital) could cause a run on the system. The Banking Act of the 1933 solved the uncertainty problem that led to bank runs by providing deposit insurance through the creation of the Federal Deposit Insurance Corporation (FDIC). Depositors no longer had to run on the bank because the government guaranteed deposits, the bulk of bank liabilities. Along with this government backstop came the fact that deposit insurance creates moral hazard – the incentive for banks to undertake greater risk than they would otherwise have taken without deposit insurance. Regulators and policymakers understood that deposit insurance could lead to excessive risk taking, so they set up a number of counteracting barriers.

In particular, banks would have to pay fees to be part of the deposit insurance system. So, at least, on an *ex ante* basis, regulators took into account the cost of the insurance. Deposit insurance was limited in magnitude per account, thus restricting the size of the banks. Most important, there were the so-called Glass-Steagall restrictions: the risk-taking activities of banks were ring-fenced to the extent there was a separation of commercial banking (taking deposits and making commercial loans) from arguably more risky investment banking activities (underwriting and dealing in corporate debt, equity securities and municipal revenue bonds). In addition, there would be enhanced supervision of individual banks, generally in the form of minimum capital requirements, as well as winding-down provisions in the case of failure. Capital requirements represent protection against the risk-shifting incentive arising from deposit insurance, because the incentive only exists when leverage and/or asset volatility are high.

While there are many reasons for the relative calm of the U.S. financial system for the fifty years after the Great Depression, many analysts point to the financial regulation that was enacted in 1933, complemented by securities and investment legislation enacted in 1933, 1934 and 1940.

But starting in the early 1980s, the U.S. banking system began to show some cracks. Ignoring international shocks such as the emerging market crisis of 1981, the real estate crises in Japan and the Nordic countries in 1991, the Mexican "tequila" crisis of 1994, and the Asian contagion of 1997, it may be surprising to recall that the U.S. suffered a number of events during this time that could have led to financial crises that might have been far more serious than they turned out to be – the failure of Continental Illinois in 1984, the S&L crisis of the 1980s, the stock market crash of 1987, the LTCM crisis in the fall of 1998, and the burst of the dotcom bubble in 2000. So what happened during this period that ultimately made the serenity of the U.S. financial system fade away and ultimately evaporate in the most recent crisis?

B. Bank Competition, Financial Innovation and Risk-Taking in the Last Decades of the 20th Century

There is considerable debate about why the banking system changed so much in the 1980s, but the general consensus is that technology changed the nature of banking and therefore competition in the banking sector (Kroszner (2000) and Kroszner and Strahan (2007)). Some of these technological changes included (i) the development of the automated teller machine (ATM) that reduced geographical ties between banks and depositors, (ii) the proliferation of money market funds and cash management accounts outside the banking system, and (iii) the increase in the types of communication channels, reducing again the ties between local bankers and depositors. In other words, traditional lines of business of banks no longer enjoyed their privileged status as financial intermediaries.

In an important paper, Keeley (1990) uses the increase in bank competition as an explanation for the Savings and Loan (S&L) crisis of 80's. Prior to the aforementioned changes in financial technology, banks and thrifts enjoyed monopolistic advantages and their charters had significant franchise value. But once this franchise value was diminished, the benefits associated with risk-shifting and exploiting the guarantees of deposit insurance increased. In general, there is convincing evidence of risk-shifting related to deregulation and increased banking competition that was a prime explanation for the S&L crisis (Saunders, Strock and Travlos, 1990, Cordell, MacDonald and Wohar, 1993, Kroszner and Strahan, 1996 and Hovakimian and Kane, 2000).

Around the same time, the institutional side of banking also changed dramatically. For example, there was tremendous growth in the so-called "shadow" banking system, i.e., financial institutions outside the traditional banking system that provide very similar services (Adrian and Shin, 2009, Acharya, Schnabl and Suarez, 2009 and Gorton, 2009). The shadow banking system includes derivatives – futures, options, swaps - as well as repos and money market funds, securitization of loans in the mortgage, corporate, and household sectors, and an increasing importance of public equity and bond markets. As an illustration, the amount of assets of the financial sector held by depository institutions dropped from 60% in 1950 to less than 30% in 2006 (Kroszner and Melick, 2009). In Section III we provide a detailed analysis of this banking model that took hold in the 80's and appeared to flourish thereafter.

Partly because of these dramatic changes in the nature of financial intermediation, there was general recognition that certain provisions of the Banking Act of 1933 – those most commonly referred to as the Glass-Steagall provisions - had become obsolete. This process of erosion of the allowable scope of commercial bank activities started in the mid 1980s with the reinterpretation of Section 20 subsidiaries of banks (which were permitted to carry out Glass-Steagall prohibited activities within certain limits), later with the Riegel-Neal Interstate Banking and Branching Efficiency Act of 1994, and then finally with the formal repeal of Glass-Steagall through the Gramm-Leach-Bliley Financial Services Modernization Act of 1999. The deregulatory environment continued thereafter, with the Commodity Futures Modernization Act of 2000, and in August 2004 with the amendment to the "net capital rule" of the Securities Exchange Act of 1934 allowing investment banks to dramatically increase leverage and put them on equal footing with universal banks under Basel II.

The result of these changes was to leave the financial system for the most part unprotected by the safety infrastructure that had been created in the 1930s, and, in many ways, even weaker in a regulatory sense than at any time since the early 1900s. This is not to argue that the Banking Act of the 1930s should necessarily have remained in place, only that whatever replaced them should have been mindful of the market failures that led to their passage in the first place. One only has to look at two episodes in the 1980s to understand this point.

i. Continental Illinois[4]

In 1982, federal regulators decided to close the Oklahoma-based Penn Square Bank, a $436-million asset bank that specialized in oil and gas sector loans. Penn Square originated large volumes of loans to the historically risky exploration sector of the US energy industry, which began to suffer as energy prices fell after 1981. The seventh largest bank in the U.S., Continental Illinois, had invested aggressively alongside or through Penn Square and held hundreds of millions of dollars of Penn Square's book of loans. Continental had made many other loans to the energy sector and had also expanded its business risk by lending large amounts to developing countries to help them finance external debt incurred in the energy crises of the 1970's. In 1982, Mexico was forced to begin renegotiating its syndicated bank debt, triggering the emerging market debt crisis that was not fully resolved for almost a decade.

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[4] This account relies heavily on FDIC (1997).

While many other US commercial banks followed the same strategy of lending to credit hungry markets in the late 1970s, Continental's credit exposures were compounded by a funding strategy that was unusual at the time. Traditionally, banks fund growth in their lending activities by attracting larger volumes of savings from retail depositors. Continental, however, had a limited retail presence, due in part to federal and local banking regulations. The bank depended heavily on funding from the wholesale money markets. Indeed, by 1981, Continental gained most of its funding through federal funds and by selling short-term certificates of deposit on the wholesale money markets. Only 20% of its funding came from traditional retail deposits.

Continental had pursued an aggressive growth strategy and assumed concentrated risk financed mostly with short-term wholesale debt. When the energy sector turned sour and the developing countries renegotiated their debt, Continental was unusually vulnerable to the views of the wholesale funding markets. In 1984, investors and creditors lost confidence and in a precursor to the crisis of 2007-2008, Continental was quickly shut out of its usual sources of funding in the domestic and Eurodollar interbank markets. In May of 1984, Continental experienced what the FDIC described as a high-speed electronic bank run. To stem the panic, regulatory agencies and the banking industry arranged massive emergency funding for the bank. The fear was that a failure of Continental would undermine the entire banking system. As a matter of fact, more than 2,300 banks had correspondent accounts with Continental.

In an extremely controversial decision, the Federal Deposit Insurance Corporation tried to stop the bank run by extending a guarantee to uninsured depositors and creditors at the bank. This was arguably the beginning of the notion that some banks should be considered "too big to fail". The emergency help was followed by a package of permanent measures, making Continental the largest bank in the history of US banking ever to be rescued by government agencies. Unable to find a takeover partner, the FDIC ended up owning more than 80% of Continental. Management was fired, the board replaced and the bank was returned to the private sector in an IPO, later to be sold at a significant premium to Bank of America. The FDIC's share of the bill to rescue the bank was later calculated to be $1.1 billion. Although many considered the rescue of Continental under the leadership of Fed Chairman Paul A. Volcker a crisis management *tour de force*, it nevertheless signaled to unsecured creditors that they were likely to be fully protected against losses by the government under systemic risk circumstances. Market discipline was not eroded in the case of shareholders, who were wiped out, but it was eroded in the case of creditors, thereby creating moral hazard for the future.

The Continental story provides a classic example of how a sharp drop in confidence can lead counterparties in the wholesale markets to suddenly withdraw funding from a damaged bank, spinning the institution into a funding liquidity crisis as potentially fatal as any nineteenth-century run on a bank by retail depositors. It should have been a warning call that systemic risk can build up quickly in a credit expansion cycle – outside of the traditional banking technology (deposits) – and needs to be priced and regulated accordingly. Continental Illinois should have been the canary in the coal mine. It showed that the regulatory system crafted in the 1930's needed serious updating. Instead, the problem was soon forgotten and eventually resurfaced with a vengeance.

ii. The Savings and Loan Crisis

The most serious post-war crisis in US the banking sector was the Savings and Loan (S&L) Crisis of the late 1980's. It is often blamed (with at least some justification) on the more permissive regulatory environment that evolved during the Reagan Administration (White, 1991), and was repeated during the Clinton Administration a decade later. That isn't the entire story however, and it is an episode that contains valuable lessons for the crisis of 2007-2009.

US Savings and Loan institutions, as distinct from commercial banks, were also a product of the Great Depression. They were created to serve the public policy goal of encouraging home ownership. The Federal Home Loan Bank Act of 1932 created the Federal Home Loan Bank System to provide liquidity and low-cost financing for S&Ls. There were 12 regional Home Loan Banks that were owned by their members and were under the supervision of the Federal Home Loan Bank Board (FHLBB). The National Housing Act of 1934 created the Federal Savings and Loan Insurance Corporation (FSLIC) to provide deposit insurance for S&Ls similar to what the FDIC provided for commercial banks. In contrast to the FDIC, which was established as an independent agency, the FSLIC was placed under the authority of the FHLBB.

For decades, the FHLBB's examination, supervision, and regulation capabilities were relatively poorly developed, in part because S&Ls had a narrowly defined role in the intermediation sector and not much scope for expanding it. S&Ls took in household savings, on which they paid relatively low interest rates, and lent at attractive interest rates on thirty year fixed rate mortgages. This model began to change with the high inflation of the 1970's when interest rates soared in response to accelerating inflation during the Carter Administration. Deposits began to flee the S&Ls in pursuit of higher returns and, even when Congress lifted caps on deposit interest rates, the S&Ls were still being squeezed on the other end by their portfolios of 30-year fixed rate mortgages. They needed to find other sources of income. As described earlier, many economists view this as the period when S&Ls moved more towards a risk-shifting model, exploiting their federal deposit insurance backstop. To accomplish this, the S&Ls needed to circumnavigate or erode existing regulations.

This began with the FHLBB itself loosening regulations covering S&Ls. It allowed the thrifts to begin issuing adjustable rate mortgages. Congress also encouraged S&L diversification, and explicitly authorized consumer lending and investment in commercial real estate. Both federal and state thrift regulators began relaxing restrictions on their asset allocation, relaxing safety and soundness regulation, lowering capital requirements, and changing accounting rules to make it easier for S&Ls to meet their net worth requirements. All of these changes helped the thrift industry to grow rapidly. Between 1980 and 1986, 492 new thrifts were chartered in the United States.

Things began to change when inflation was brought under control in the early 1980s by the Volcker experiment, accompanied by a serious recession. Oil prices fell to a level that made many investments in that sector unprofitable. Tax benefits for real estate investments were eliminated, and that made many projects unprofitable. Much of the financial intermediation growth between 1983 and 1985 was in commercial real estate lending. By 1985, it became clear that the thrift industry faced serious trouble. Enough S&Ls had folded or were in danger of folding that the FSLIC itself was insolvent. Efforts to recapitalize the FSLIC in 1986 and 1987 were bitterly fought by the industry, which lobbied aggressively with members of Congress. Thrift failures increased during 1987 and into 1988, but the insolvency of the FSLIC meant that rescuing troubled thrifts would cost more than the FSLIC had available in its insurance fund. As a result, the regulators could not intervene in S&Ls that had more liabilities than assets. This meant that several insolvent thrifts remained in business. These "zombies" had incentives to take even more risks in the hope that they could eventually improve their outcomes.

The crisis in the S&L industry was finally acknowledged and resolved after the inauguration of George H.W. Bush in 1989. Congress passed the Financial Institutions Reform Recovery and Enforcement Act (FIRREA) in 1989. FIRREA abolished the FHLBB and shifted regulation of S&Ls to the Office of Thrift Supervision (OTS), transferred the thrifts' deposit insurance function from the FSLIC to the FDIC, and reinstituted many of the regulatory provisions that had been weakened during the previous decade. In addition, FIRREA created the Resolution Trust Corporation (RTC) to liquidate or restructure the insolvent S&Ls.

There are several lessons from the S&L mess. The first is that when regulatory institutions have outlived their usefulness or been rendered obsolete it is not enough to just eliminate the regulatory boundaries without consideration of the risks that are being created. This was the case with the thrift industry, which had been created and developed with specific goals in mind but then morphed into something else entirely. Another lesson is that regulators can easily be captured by the industry they regulate. This was clearly the case with the FHLBB. The S&L

Crisis makes it clear as well that moral hazard is an important issue. It demonstrated how critical it is to promptly close insolvent, insured financial institutions in order to minimize potential losses to the deposit insurance fund and to ensure a more efficient financial marketplace. Finally, resolution of failing financial institutions requires that any deposit insurance fund be strongly capitalized with real reserves based on meaningful risk assessments.

C. Risk-Taking Incentives of Financial Institutions

Given their inherently high leverage and the ease with which the risk profile of financial assets can be altered, banks and financial institutions have incentives to take on excessive risks. Ordinarily, one would expect market mechanisms to price risks correctly and thereby ensure that risk-taking in the economy is at efficient levels. However, there are several factors – some novel and some traditional – that have ruled out such efficient outcomes.

i. The Novel Front

Financial institutions have become large and increasingly complex and opaque in their activities. This has weakened external governance that operates through capital markets (accurate prices), the market for corporate control (takeovers), and the role and functioning of boards of directors. Coincidentally there is the fact that financial risks at these institutions are now increasingly concentrated in the hands of a few "high performance" profit/risk centers. Employees (bankers, traders) engaged in these centers have skills in creating, packaging-and-repackaging, marking to market and hedging financial securities. Since such skills are largely fungible across institutions, such employees have exerted tremendous bargaining power in their institutions and have succeeded in getting themselves rewarded through highly attractive, short-term compensation packages that provide them lucrative cash bonuses for short-run performance and what has shown itself to be effectively "fake-alpha".[5]

In the period leading up to the recent crisis, bankers were increasingly paid through short-term cash bonuses based on volume and on marked-to-market profits, rather than on the long-term profitability of their "bets."[6] So they had no incentive to discount for liquidity risk, for example, that of asset-backed securities, if their bets went wrong and nobody wanted to buy these securities. Nor was there an incentive to discount for the "maturity mismatch" inherent in special investment vehicles off the banks' balance sheets — which funded long-term assets via short-term debt (asset-backed commercial paper) that had to be rolled over frequently, generally overnight. Nor, apparently, did their managers assess the true skills of those who were generating these large "profits." In effect, regulatory arbitrage – taking on risks and financing structures that were not subject to significant capital requirements – became a primary business of the financial sector because of the short-term profits it was generating.

A case in point.[7] In the summer of 2005, UBS, the Swiss-based LCFI, became a major player in subprime mortgage collateralized debt organizations (CDOs). It purchased pools of subprime mortgages from mortgage originators and sliced and diced them so that the "super senior" tranches would receive the highest designation from the rating agencies. The resulting AAA securities would then be sold off to investors. UBS was paid handsomely for structuring these deals. This business usually worked as intended -- the credit risk that would normally be held by UBS or other banks or mortgage lenders was transferred to the better-capitalized investment community.

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[5] Of course, whether the high level of compensation paid to bankers or traders was a symptom of weak governance or a result of the equilibrium outcome of a competitive labor market remains an open question. Gabaix and Landier (2008), for example, show how the latter mechanism can explain pay scales of such magnitude.

[6] See Rajan (2008) for an early hint of this problem with bankers' pay. Acharya, Pagano and Volpin (2009) and Acharya and Volpin (2010) provide models explaining why pay may have risen in the banking industry, and coincidentally risk management (governance) quality deteriorated, due to greater mobility of risk-takers across financial institutions. Acharya and Richardson (2009) provide a detailed account of such governance failures (see, especially, chs. 7 and 8).

[7] The following account is taken from UBS's "Shareholder Report on UBS's Write Downs," 2008, prepared for the Swiss Federal Banking Commission.

Starting in 2006, however, the CDO group at UBS noticed that their risk-management systems treated the AAA securities as essentially riskless, even though they yielded a premium (the proverbial free lunch). So they decided to hold onto them rather than sell them. After holding less than $5 billion of these securities in February 2006, the CDO desk was warehousing a staggering $50 billion of them by September 2007. Incredibly, this happened even though the housing market had turned south in June 2006; subprime lenders had begun to go belly-up in December 2006; and UBS itself shut down its in-house hedge fund, Dillon Read Capital Management, in May 2007 due to subprime investment losses. None of this mattered to the UBS CDO group. For every $1 of super senior securities held, it booked the premium as immediate profit. And for every dollar of current "profit" booked, the members of the CDO group received correspondingly high bonuses. The members of the group had every incentive to increase the quantity of CDOs on the balance sheet as much as possible, since their own bonuses were tied to instant profits with no recognition of any risk. In a similar fashion, by the late summer of 2007 Citigroup had accumulated over $55 billion of AAA-rated CDOs.

Many analysts have taken stories like UBS, and the fact that many of the shareholders of the failed (or near failed) institutions – Bear Stearns, Fannie Mae, Freddie Mac, Lehman Brothers, A.I.G., Merrill Lynch, Washington Mutual, Wachovia and Citigroup – lost most of their investment in bank stocks in the crisis, as prima facie evidence of massive failure of corporate governance, i.e., between shareholders and managers. While clearly this view cannot be completely discounted, we believe it is actually secondary in importance compared to the failure of corporate governance at the debt and regulatory level. Put another way, it appears to us that shareholders of LCFIs themselves benefited from the risk-taking option inherent in such CDO bets at the expense of creditors and taxpayers.

ii. The Traditional Front

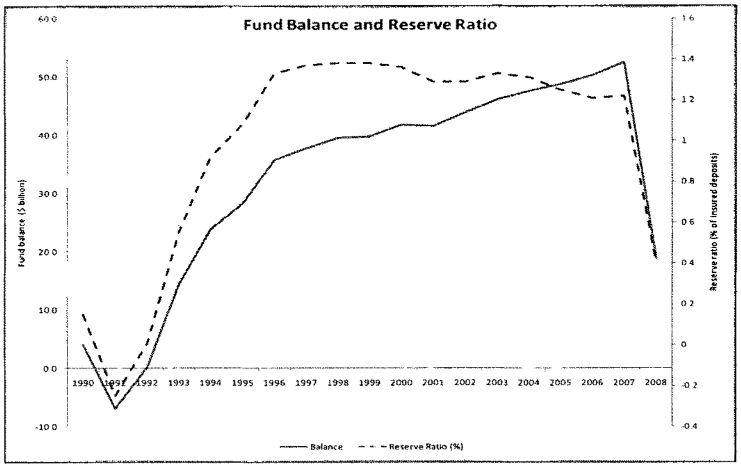
To understand risk-taking incentives in large and complex financial intermediaries, we need to examine how the claim structure of the LCFIs is different from that of a regular non-financial firm. On the liability side, LCFIs are highly leveraged entities. At least 90% of the claim holders of an LCFI are debt holders (including depositors). Of course, other claimants comprise taxpayers through the numerous government guarantees in the system, most notably (i) deposit insurance, (ii) the implicit guarantee of too-big-to-fail institutions, and (iii) the "subsidies" provided to government-sponsored enterprises like Fannie Mae and Freddie Mac. That is, the vast majority of liabilities in the U.S. financial system were the beneficiaries of some form of safety net (see, for example, Marcus and Shaked, 1984, and Pennacchi, 1987).

Given this structure of claims, corporate governance mechanisms that align managers with shareholders may deviate significantly from those that maximize firm value. Put differently, corporate governance mechanisms in LCFIs have to be designed so as to align the manager with the interests of the debt holders and the FDIC guarantor, as well as the shareholders. Monitoring by debt holders and the regulator are critically important components of corporate governance in LCFIs (see John and John, 1993, for details) compared to nonfinancial corporations. What kind of monitoring can one expect from debt holders? If the debt holders are depositors, deposit insurance reduces the incentives to monitor virtually to zero.

Of course, the fact that banks are covered by deposit insurance does not in itself necessarily lead to excessive risk-taking on their part. If the franchise value of their enterprise exceeds the benefits due to risk-shifting, then there might be very little effect on risk-taking as a result of deposit insurance. But two sets of consequences arose from competition that eroded the profits underlying the traditional lines of business of banks, described earlier. First, banks moved more and more into businesses focusing on noninterest income, such as trading and fee-based activities (e.g., Stiroh, 2002). Second, and more importantly, the relative value of risk-shifting increased given that value of bank charters had decreased. If the guarantees turned out to be mispriced, then the mispricing effectively removed any market discipline component of governance normally reserved for creditors. And risk-shifting within large financial intermediaries was particularly easy to do.

There is very strong evidence in the literature supporting the existence of mispriced government guarantees and the consequences arising from such guarantees. In terms of the financial crisis of 2007-2009, what was the source of regulatory failure? With respect to deposit insurance, as described earlier, there seems to be a consensus that moral hazard played an important role in both initiating and prolonging the S&L crisis. As a result, there were substantial reforms enacted to address this issue, most notably the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991. One of the major changes in setting FDIC premiums was to make them more risk-based. In theory, the FDIC assesses higher premiums on those institutions that pose greater risks to the insurance fund. In practice, if the deposit insurance fund was well-capitalized (i.e., 1.25% of reserves to total insured deposits), it turned out that no premiums were assessed to those banks. In fact, from 1996 to 2006, more than 90 percent of all banks paid very little in deposit insurance premiums.[8] Figure 1 effectively illustrates this point by showing a reserve ratio close to 1.25% during this period, combined with a small increase in deposit insurance fund balances.

Figure1: Balances of Deposit Insurance Fund and the Reserve Ratio



Source: Federal Deposit Insurance Corporation

The S&L crisis clearly suggested the need for risk-based insurance premiums to be charged to banks. The market failure was that not only was the risk-based method not applied, but no insurance premiums at all were charged to the majority of banks. This effectively meant that the U.S. had a free deposit insurance system with little or no protection at all in place in consideration of the repeal of Glass-Steagall and the changing institutional and systemic risk exposures in the financial structure.

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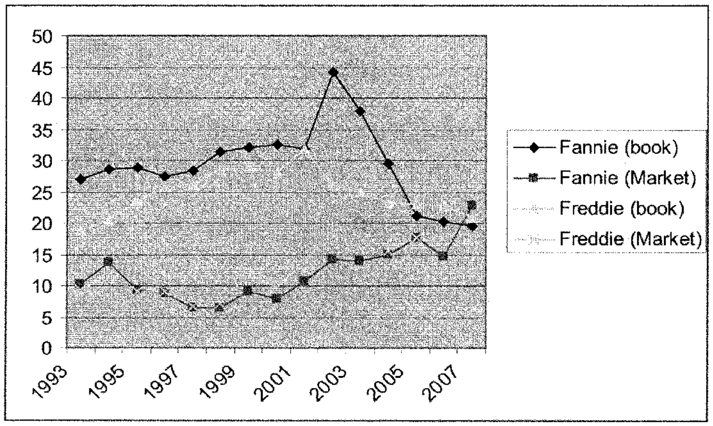
[8] This issue was only partially addressed by the Federal Deposit Insurance Reform Act of 2005 to the extent the range of ratio of reserves to total deposits covered a wider range for which premiums would be collected.

At first glance, the moral hazard inherent in depository institutions was limited in scope, since deposits were only a limited component of the assets (and liabilities) of the U.S. financial system. However, since the majority of assets of the financial sector were held by a small number of LCFIs, the market discipline provided by debtholders was similar to that of depositors due to the too-big-to-fail (TBTF) guarantee. Since the 1984 bailout of Continental Illinois, the issue of TBTF had been much discussed in regulatory and academic circles (see, for example, Stern and Feldman, 2004, and Ennis and Malek, 2005). Even before the financial crisis of 2007-2009 made the TBTF guarantee explicit, there was ample evidence that TBTF was alive and well over the previous two decades, and seriously distorted financial market pricing (see, for example, O'Hara and Shaw, 1990, Penas and Unal, 2004 and Morgan and Stiroh, 2005).

To understand further the importance of moral hazard and the role of government guarantees, consider the case of the government sponsored enterprises (GSEs), Fannie Mae and Freddie Mac. Fannie Mae was founded in 1938 in the wake of the depression to provide liquidity and aid to the mortgage market. It became a government sponsored enterprise in 1968, and shortly after, Freddie Mac was formed to compete with Fannie Mae to create a more efficient secondary market for mortgages. While not explicit, there has always been the presumption that both the guarantor function and debt of these GSEs had full backing of the U.S. government. Indeed, the GSEs' debt generally was priced marginally above the prevailing treasury rate.

Consider the investment function of the GSEs. For every $1 of mortgage-backed securities purchased with equity, there was a large amount of debt issued to purchase additional mortgage-backed securities. Figure 2 shows the book and market leverage ratios of the GSEs, measured as assets divided by equity, over the period 1993 to 2007. The extraordinary point to note is the access to very high leverage, given that the GSEs were investing in risky, relatively illiquid mortgage-backed securities. This provides an idea of the size of the implicit government guarantee. In fact, the literature has quantified the transfer from taxpayers to the GSEs to be in the billions of dollars even before the crisis ignited (see, for example, Passmore, 2005 and Lucas and McDonald, 2006).

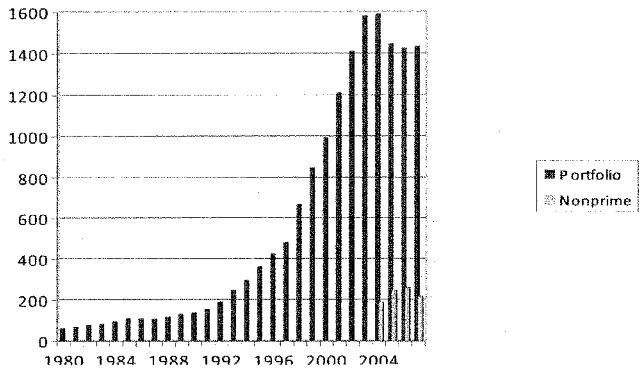
Figure 2: The Leverage Ratio of the GSEs (1993-2007)



The investment portfolio of the GSEs became markedly riskier through time as they began to load up on non-prime mortgages under pressure from Congress and the Clinton Administration. Successive Secretaries of Housing and Urban Development (HUD) mandated that the GSEs increase the share of mortgage loans and guarantees to low-income households to

50% and then 60% of their portfolios. Although some analysts have argued that the GSEs' non-prime bets were much larger (Pinto, 2008), it is clear that by the mid 2000's at least 15% of the GSEs' funds were invested in subprime mortgages. In contrast to prime mortgages, however, these were not hedged using corresponding interest rate swaps. Figure 3 provides the size of the GSE mortgage portfolios, noting the rise in subprime holdings over the later years. Of course, with the lack of market discipline due to the government's guarantee, one would expect that the GSEs would invest in riskier assets to the extent possible. Quite apart from their politicized character, it is therefore not surprising that, as nonprime mortgages took off, the GSEs substituted risk toward these assets. The hybrid nature of the GSEs and the implied sovereign guarantee, in short, underlay a financial disaster waiting to happen.

Figure 3: The size of the GSE retained mortgage portfolio (in billions of $)



To summarize, the traditional role of banks together with the limits imposed on them by Glass-Steagall led to relative calm in the US financial system for fifty or so years after the 1930s.

Once the Glass-Steagall barriers were lifted, the only real protection for the financial system was capital requirements and appropriate pricing of government guarantees covering individual financial institutions. With little or no pricing of government guarantees, the only remaining obstacle to increased risk-taking and systemic exposure was capital requirements. As we argue in Section III, the financial crisis of 2007-2009 is centered on how LCFIs and other Wall Street firms exploited loopholes in regulatory capital requirements to take on an under-capitalized $2-3 trillion highly leveraged, one-way asymmetric bet on the economy, particularly tied to residential real estate but also involving commercial real estate and consumer credit.

III. THE NEW BANKING MODEL OF MANUFACTURING TAIL RISK[9]

Given this background, we discuss the shift in the banking model during 2003-2Q2007 compared to the traditional banking and securitization models.

The simple theory of banking is that banks act as financial intermediaries between depositors and borrowers (Diamond, 1984). Depositors provide funds to make loans, and banks provide expertise in assessing the creditworthiness of borrowers. Historically, then, the asset side of a bank's balance sheet (Figure 4) would consist of loans funded by deposits as well as loans funded by equity (and in general non-deposit debt).

A bank's loans are considered assets because they are owed to the bank by borrowers. Deposits are considered liabilities because, upon demand, they must be returned by the bank to the depositors. In the meantime, however, most deposits have been lent out to borrowers, with the exception of liquidity reserves, and the interest on these loans is the main source of the commercial bank's profits. Most deposits, therefore, are unavailable at any given time to be reclaimed by the depositors.

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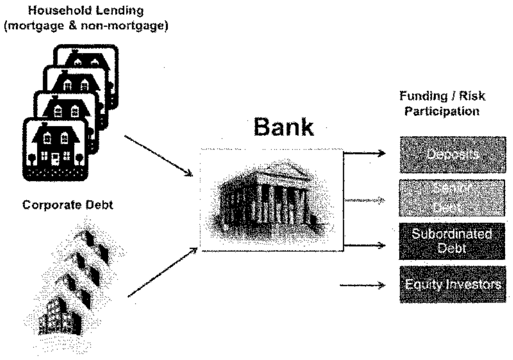
[9] This section draws heavily on the discussion in Acharya and Richardson (2009b).

Figure 4: Traditional Banking[10]

Bank Balance Sheet

Assets	Liabilities
Loans	Deposits
	Capital/Equity

The Traditional Banking Model



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[10] We are grateful to Philipp Schnabl for schema describing traditional bank balance sheet and its modern forms.

To avoid the possibility that all the depositors will demand the return of their deposits at the same time — as occurred during several panics between 1850 and 1914 and during the Great Depression — we have emphasized that deposits are generally insured up to a certain amount by the government. In return for this guarantee and an insurance fee, and to ensure that banks have a stake in the process, banks are required to hold a minimum amount of "capital" as a buffer against losses. Quite apart from simple prudence in management and governance, even in the days of the Medicis in Florence or the Fugger in Frankfurt, banks that wanted to survive kept a sharp eye on capital adequacy. And while there are other complementary explanations of bank-capital regulation, this simple one suffices for exposition of our main point. For these purposes, what constitutes "capital" is defined by regulators. The regulations in place in the run-up to the crisis in most Western countries defined capital in terms of funds obtained either by raising equity (selling stock or certain forms of "hybrid" debt that has equity-like features), or by retaining earnings. We will shortly point out that banks' efforts to circumvent these capital-adequacy requirements caused the financial crisis.

In a world without deposit insurance, capital-adequacy regulations might in fact be unnecessary, as it often was in banking history. The creditors of financial institutions (depositors, uninsured bondholders, and other counterparties) would apply pressure to curb excessive risk taking. Uninsured bondholders and other counterparties could do this by charging higher interest rates to banks that took what seemed to be excessive risks. Similarly, depositors could demand higher interest rates on their deposits in exchange for the higher risk involved in using such banks. And if unanticipated risks seemed to arise in a given bank, they would take their money elsewhere, or under stress conditions participate in bank runs (akin to the run of unsecured creditors on banks during the ongoing crisis). But the creation of deposit insurance created a risk of moral hazard for traditional banks, and similarly, implicit government bailout guarantees for institutions that are considered too big to fail created moral hazard for today's LCFIs.

The bank-capital regulations of most Western countries follow the terms recommended by the Basel Committee on Banking Supervision (BCBS) of the Bank for International Settlements in Basel, Switzerland. Under the Basel accords, banks must maintain at least an 8 percent capital buffer against a risk-adjusted measure of their assets, although there is considerable national discretion in the actual implementation of the Accord. For instance, in the United States the FDIC has interpreted "at least" 8 percent to mean 10 percent if a bank is to be designated "well capitalized" (a designation that brings certain privileges such as lower deposit insurance premiums).

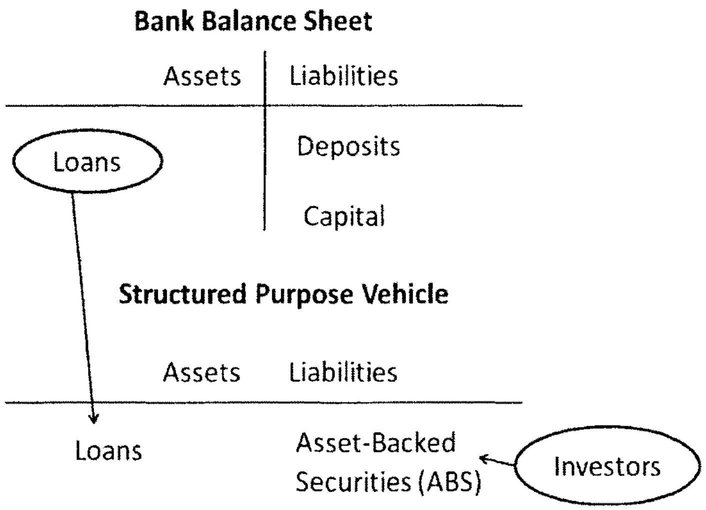
The two main forms of "capital," according to the Basel rules, are equity and retained earnings. Maintaining large capital buffers is costly from an economic standpoint since debt, especially if short-term and demandable, has market discipline role that cannot be served by the relatively passive nature of equity financing (Calomiris and Kahn, 1991, Diamond and Rajan, 2001). However, even maintaining socially efficient levels of capital can seem privately costly to bank management if their attention is focused on short-term accounting measures of performance such as return on equity (ROE). For instance, the capital can be lent out at risk-free interest rate whereas putting it away into illiquid and tail-risky assets can generate a carry over and above the risk-free rate. While the return on both forms of investment should be similar on a risk-adjusted basis, the absence of proper accounting of risks in recording of profits can make reducing capital, that is, increasing leverage, highly attractive from the standpoint of generating greater ROE over the next quarter.

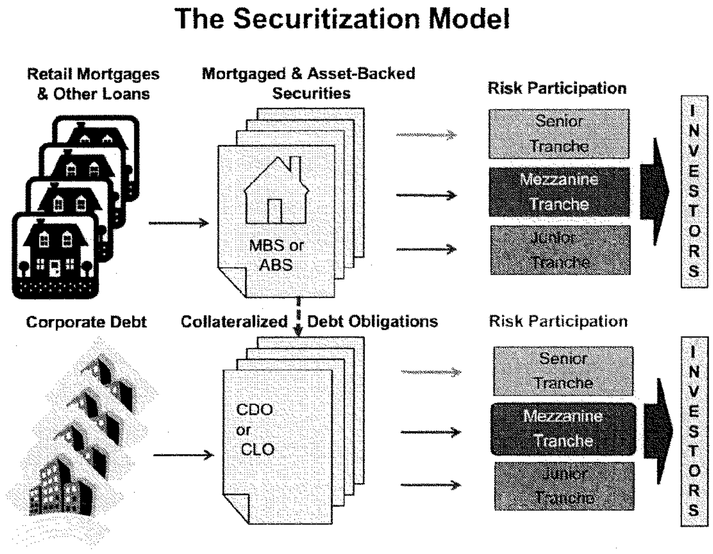
As such, in difficult times, if a bank's capital must be boosted through issuing equity shares, it generally signals to investors the adverse news that retained earnings are unlikely to be sufficient to meet the bank's capital needs (Myers and Majluf, 1984), and the new equity injections will dilute the value of existing shares (Myers, 1977) since the primary benefit of the injections accrues to creditors. It would seem that such costs of capital issuance might discipline banks and induce them to manage capital in a countercyclical manner. However, once decision-making horizons are shortened due to focus on quarterly accounting measures of performance with poor risk-adjustment of recorded profits, such dynamic and long-term incentives are lost.

Regardless of the exact nature of this cost, in order to deal with holding costly capital on balance sheet in originating assets, the model of banking evolved to focus on securitization (Figure 5). This allowed banks to avoid holding costly capital by essentially turning them into underwriters that continued to originate loans but then sell them off to others. Once loans are removed from a bank's balance sheet in this way, the 10-percent capital reserve need not be held.

Securitization explains the fact that there are today far fewer deposits in the modern financial system than there are bank loans. The U.S. banking system currently holds approximately $7 trillion in deposits, but the credit market includes $2.7 trillion in bank and leveraged loans, $3.3 trillion in commercial mortgages, $1.3 trillion in subprime mortgages, $5.8 trillion in non-agency (i.e., non-Fannie Mae or -Freddie Mac) prime residential mortgages, and $2.6 trillion in consumer loans, among others. The riskier credits, such as high-yield corporate loans, nonprime mortgages, commercial mortgages, and consumer credit, are likewise generally securitized.

Figure 5 : Modern Banking – Securitization with risk transfer





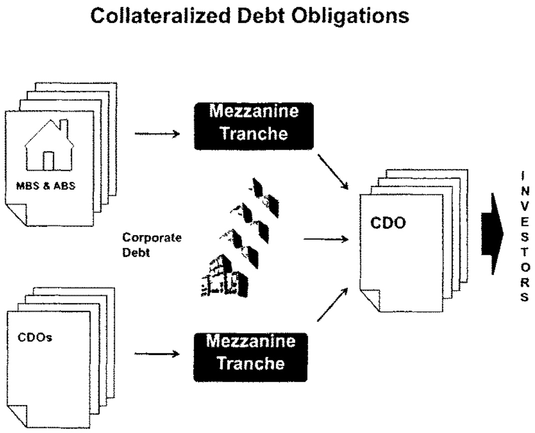
With securitization, the original idea of banking is altered. Banks are now intermediaries between borrowers and *investors* (rather than just depositors). To understand how this works, consider the successful model of securitizing prime mortgages. This involves pooling prime mortgages into mortgage-backed securities (MBSs) that pay their owners fractional streams of the interest and principal payments collectively made by the mortgage holders. The principal and interest of these mortgages are guaranteed by Fannie Mae and Freddie Mac. The U.S. residential mortgage market is worth more than $10 trillion. Over 55 percent of it is securitized, and 64 percent of these securities are backed by Fannie and Freddie.

Toward end of 2002, as credit markets began to recover from the recession of 2001, banks extended the prime-mortgage securitization model to other, riskier asset classes. This allowed banks to transfer these risks from their balance sheets to the broader capital market, including pension funds, hedge funds, mutual funds, insurance companies, and foreign-based institutions.

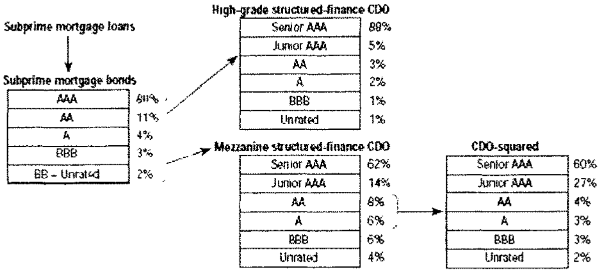
The new asset-backed securities were "structured," meaning that they divided (for example) mortgage pools into "tranches" according to the predicted riskiness of the loans. Holders of shares in the riskier tranches received higher interest payments, but in exchange, they were subject to losses before the holders of shares in the less-risky tranches suffered losses. Thus, the holders of the least-risky tranches, as determined by the three rating agencies — Moody's, Standard and Poor's, and Fitch—got a lower risk-based interest payment, but they would feel any effect of nonperformance in the structured security only after its "subordinated tranches" had stopped performing (through delinquency or default). The relatively low risk level of a AAA-rated tranche, however, did not necessarily mean that it was backed by prime loans. It might only mean that, of the thousands of nonprime loans in a given mortgage-backed security, this tranche was designated as the one that would continue to throw off income and principal income from performing debts in the entire security until all the other tranches had stopped performing.

In order to meet the demand for AAA-rated paper beyond that available from the top tranches of asset-backed securities, the mezzanine tranches of those structured could be packaged into collateralized debt obligations, which in turn could be tranched to create more AAA-rated securities, and this could be repeated for the mezzanine tranches of CDOs in the form of CDO-squared issues (Figure 6).

Figure 6 : Manufacturing CDOs and CDO-squareds



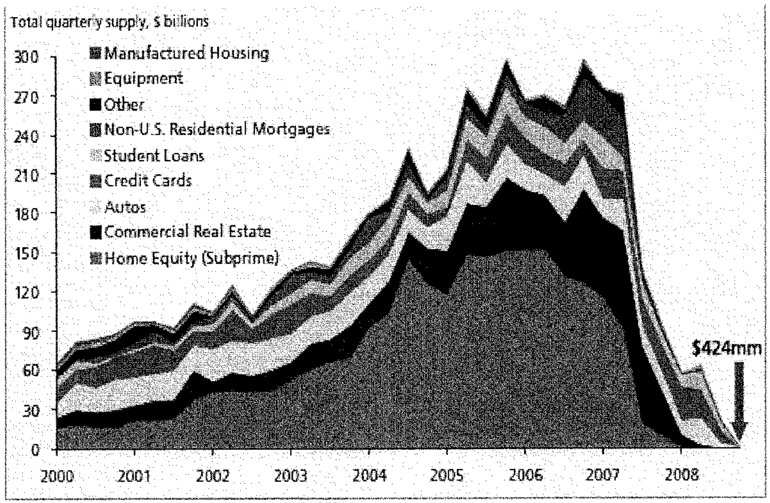
CDO-squared Multi-Layered Structured Credit Instrument



Source: IMF staff estimates
Note: CDO = collateralized debt obligation.

The growth in structured securities across Wall Street during 2002-2007 was staggering. While residential mortgage-related securities were certainly a large component of the total, so too were securities backed by such assets as commercial mortgages, leveraged loans, corporate bonds, and student loans. Figure 7 graphs the new issuance of various asset-backed securities during this period. Note that there is an almost threefold increase in new issuance from 2002 to 2007. In the aggregate, securitization worldwide went from $767 billion at the end of 2001 to $1.4 trillion in 2004 to $2.7 trillion at the peak of the "bubble," in December of 2006. By late October 2008, the market had effectively collapsed.

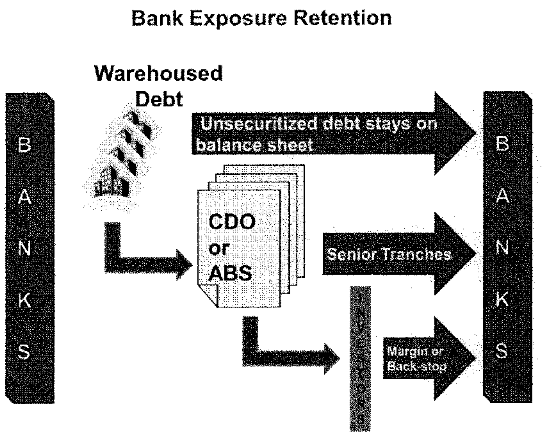
Figure 7: Asset-Backed Security Issuance, 2000-2008



Source: J.P. Morgan Securities Inc. Data as of 10/31/2008.

It is very clear that the strongest demand for these asset-backed financial products came through the creation of "highest quality" – supposed to be essentially riskless – securities, which appealed to a host of potential investors such as pension funds, insurance funds, and money market funds. Interestingly, and crucially for our thesis, however, end investors were not the chief purchasers of these securities, and, in turn, of the underlying risks that were being securitized. In fact, the banks themselves, instead of acting as intermediaries between borrowers and investors by transferring the risk from mortgage lenders to the capital market, became primary investors. In addition to normal "pipeline" exposure to assets in the process of origination, securitization and distribution, they took on "warehousing" exposure by holding onto them (see Figure 8). Since — unlike a typical pension fund, fixed income mutual fund, or sovereign wealth fund — banks are highly leveraged, this investment strategy was exceedingly risky. The goal, however, was logical - to create return on equity through the carry of asset-backed securities and simultaneously avoid minimum-capital regulations.

Figure 8: Warehousing and Retention of Risks during Asset-Backed Security Issuance

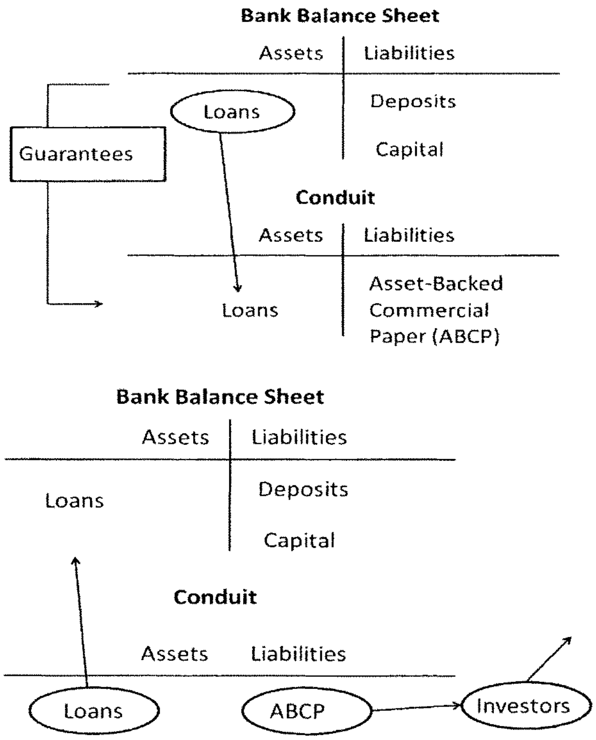


One of the two principal means for this "regulatory arbitrage" was the creation of off-balance-sheet special-purpose vehicles, which held onto many of the asset-backed securities. These vehicles were generically called "conduits." Structured investment vehicles (SIVs), which have received the most public attention, were one type of conduit.

With securitized loans placed in conduits rather than on a bank's balance sheet, the bank did not need to maintain capital against them. However, the conduits funded the asset-backed securities by issuing asset-backed commercial paper (ABCP) — short-term debt instruments sold in the financial markets, notably to investors in money market instruments. To be able to sell the

ABCP, a bank would have to provide the buyers, i.e., the banks' "counterparties," with *guarantees* of the underlying credit— essentially bringing the risk back onto the banks themselves, even though that risk was not shown on their balance sheets (Acharya, Schnabl and Suarez, 2009). This "new" banking model is depicted in Figure 9.

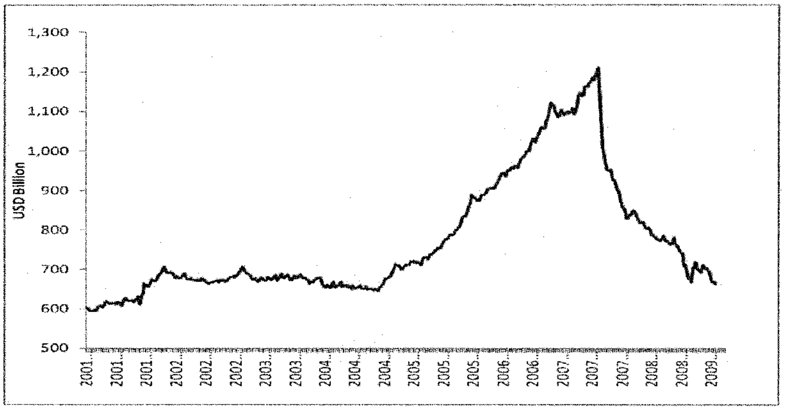
Figure 9: Modern Banking+ : Securitization without risk transfer using ABCP conduits



These guarantees had two important effects. First, guaranteeing the risk to banks' counterparties was essential in moving these assets off the banks' balance sheets. Designing the guarantees as "liquidity enhancements" of less than one year maturity (to be rolled over each year) allowed the banks to exploit a loophole in Basel capital requirements. The design effectively eliminated the "capital charge," so that banks achieved a tenfold increase in leverage for a given pool of loans. Second, the guarantees ensured the highest ratings for the off-balance sheet vehicles from the rating agencies. Indeed, the AAA ratings made it possible for banks to sell ABCP to money-market funds, which are required by law to invest mainly in AAA-rated securities. This allowed banks to fund the ABCP at low interest rates, similar to that paid on deposit accounts.

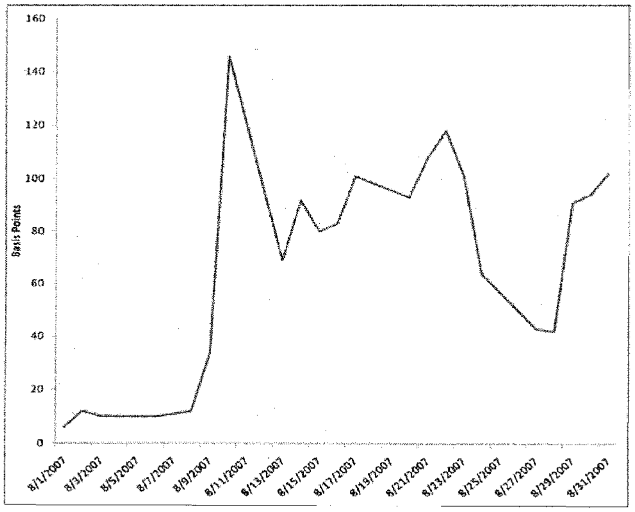
Figure 10 graphs the growth and collapse of the ABCP market over the years 2001 to 2009. ABCP issuance peaked from 2004 until the second quarter of 2007. When the collapse occurred in the next quarter, Figure 11 shows that the cost of issuing ABCP rose from just 15 basis points over the Federal Funds rate to over 100 basis points (at its peak being close to 150 basis points). Consequently the ABCP could no longer be rolled over, and the banks had to return the loans to their balance sheets. Acharya, Schnabl and Suarez (2009) show that when the crisis hit, of the $1.25 trillion in asset-backed securitized vehicles, only 4.3 percent of the loss was structured to remain with investors. The remaining loss wiped out significant portions of bank capital and threatened banks' solvency.

Figure 10: Asset Backed Commercial Paper around the Financial Crisis of 2007-2009



Source: Federal Reserve Board. Data do not include European ABCP.

Figure 11: The behavior of asset-backed commercial paper (ABCP) spread over the Federal funds rate during 2007 (Source: Federal Reserve Board)



Not all banks followed the conduit model, which financed off-balance-sheet assets through the sales of ABCP. Some chose an alternative route that had a similar effect. A bank would still make loans and move them from its balance sheet by securitizing them. But as Shin (2009) explains, the bank then turned around and reinvested in AAA-rated tranches of the same securitized products they (or other banks) had created (Figure 12). Because of their AAA ratings, these securities had a significantly lower capital requirement under Basel 2 arrangement. For commercial banks, the Basel accord weighted the risk of AAA-rated securities at half the risk of ordinary commercial or mortgage loans, and thus required an even lower capital reserve for them (20% risk weight compared to 50% for mortgages and 100% for corporate bonds). In 2004, the Securities Exchange Commission (SEC) granted stand-alone American investment banks the ability to employ internal models to assess credit risk and the corresponding capital charge. This allowed them even higher leverage than commercial banks, which duly skyrocketed from 22:1 debt to equity ratio to 33:1 within just three years.

As Table 1 shows, banks, GSEs (Fannie and Freddie), and broker/dealers in 2007 held $789 billion of the AAA-rated CDO tranches that were backed by nonprime loans, or approximately 50 percent of the volume outstanding at the time. Moreover, the majority of the subordinated tranches of the CDOs was also held by banks, broker/dealers, and monoline insurers (which insure only one type of bond —e.g., municipal bonds). They collectively held $320 billion of the $476 billion total outstanding.

Figure 12: Modern Banking+ : Originate, Distribute and Buy Back

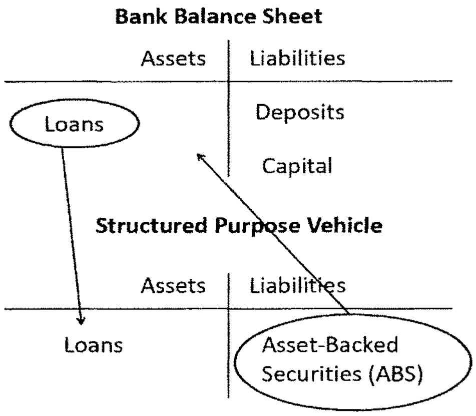


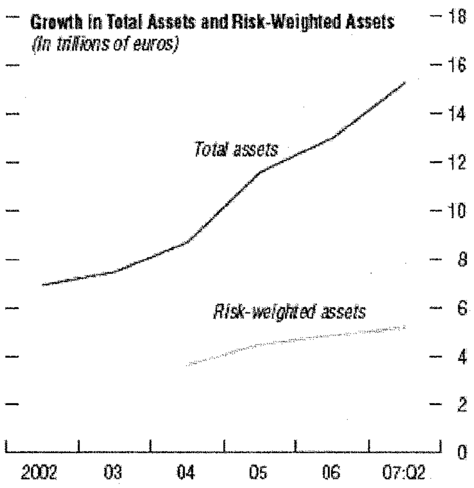
Table 1: Holdings of Mortgage-related Debt by Financial Institutions (2007)

Type of financial institutions	Loans	HELOC*	Agency MBS	Non-Agency AAA	CDO subord.	Non-CDO subord.	Total	Percentage of outstanding volume
Banks & Thrifts	2,020	869	852	**383**	90		4,212	39%
GSEs & FHLB	444		741	**308**			1,493	14%
Brokers/dealers			49	**100**	130	24	303	3%
Financial Guarantors		62			100		162	2%
Insurance Companies			856	**125**	65	24	1,070	10%
Overseas			689	**413**	45	24	1,172	11%
Other	461	185	1,175	**307**	46	49	2,268	21%
Total	2,925	1,116	4,362	**1,636**	476	121	10,680	
	27%	10%	41%	**15%**	4%	1%		

Source: Krishnamurthy (2008)

To recap - while the assets on banks' balance sheets doubled between 2004 and the middle of 2007, the regulatory assessment of the risk of these assets grew at a far slower pace. As a result, banks were considered by the regulators to have been investing in relatively safe assets over this period because the assets were rated AAA. This enabled banks to double their leverage, and hence the quantity of profitable loans they could make. Figure 13 shows this trend in the quantity of total assets of top ten publicly traded banks relative to the trend in the quantity of their *risk-weighted* assets.

Figure 13: Trends in bank assets, nature of assets and leverage



Source: International Monetary Fund Global Financial Stability Report, April 2008

Why did the banks create, securitize and then retain the risks associated with highly systematic and long-term assets such as subprime mortgages?

Take the AAA-rated tranches of subprime CDOs. True, they were risky. But banks that held these tranches had it both ways: On the up side, they reduced their capital requirements, and they (or other investors) earned the higher premium commanded by the risky nature of subprime loans. For example, at the peak of the housing bubble, in June 2006, even the relatively low-yield AAA-rated tranches of subprime CDOs offered twice the premium of the typical AAA credit-default swap of a corporation. On the down side, losses would only occur if a large number of subprime mortgages got hit at once, in which case even the AAA tranche of a CDO got hit. If such a rare event actually occurred, however, it would almost surely result from an economic catastrophe – a systemic shock affecting all markets at the same time.[11] The banks were betting their futures that this would not happen, or that the decision makers' time horizons were too short for them to care if it did happen. Of course, bad things do happen.

To get some understanding of how hard the systemic shock hit the AAA tranches, of asset backed securities and their derivatives, Figure 14 graphs the various AAA-rated ABX index series from their initiation until the end of 2008 – an index of 20 representative CDOs of subprime mortgages. Such indices are initially priced at par, and one can see that the 2006 series stayed around that level until late July 2007, when the crisis got underway. Depending on the series, the AAA tranches were selling from 20 cents to 80 cents on the dollar as of May 2009. Putting aside issues specific to the pricing of the ABX, at the borrowing costs shown in Figure 11 and given the aforementioned $789 billion of exposure, losses to the financial sector at the time ranged from $158 to $473 billion on their holdings of the AAA-tranches of mortgage-backed securities alone.

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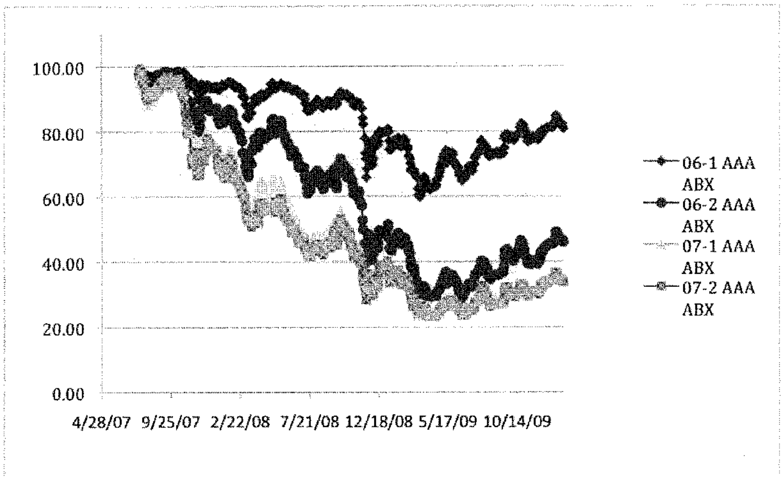
[11] Coval, Jurek and Stafford (2008), therefore, call these kinds of tranche products "economic catastrophe bonds".

Figure 14: Subprime Mortgage AAA-Tranche Pricing (2007-Jan 2010) (source: Markit)



Source: Markit. The Figure tracks the prices, from January 1, 2007 to February 17, 2010 of the ABX index of AAA tranches of mortgage-backed securities issued in the first and second halves of 2006 and 2007. The ABX index is an index of 20 representative collateralized debt obligations (CDOs) of subprime mortgages. The AAA tranche index represents an initial equally-weighted portfolio of the AAA tranches of each CDO.

Similarly, the financial firms that used off-balance-sheet conduits had, through the guarantees they issued on the ABCP, written huge quantities of insurance against a systemic decline in the overall economy, especially in the housing market. In the case of both AAA tranches and conduits, the guarantees were often provided by third-party insurers such as monolines and other insurers. Most prominently AIG, which also tried to have it both ways - they collected insurance premia when times were good, and would have to honor their promises only when there was a systemic decline of markets and the economy.

Effectively, the entire financial sector was riding a massive one-way bet on the economy. Commercial banks, through ABCP guarantees, and investment banks and insurance companies, through AAA-rated tranches and insurance on the tranches, had set up a way to (1) sell deep out-of-the-money (OTM) options, (2) with sector concentrations primarily on housing – a highly systematically risky and long-term asset, and (3) funded with short-term debt finance such as ABCP in case of conduits set up by commercial banks and unsecured commercial paper in case of investment banks. This intricate structure ensured that banks had a "carry" – both due to term premium in funding long-term assets with short-term debt and as a result of the systematic risk imbedded in the underlying mortgages. This carry can be alternately viewed as the price obtained by selling OTM options. And in this case, the options were structured with the aid of securitization in a way so as to arbitrage or optimize regulatory capital requirements. In aggregate, banks were not holding sufficient capital against the contingency that the tail systemic risk would materialize. The aggregate systemic exposure was hair-raising. During the period 2003-07, banks used an accounting-based notion of profits that did not suitably correct for the long-run risk and return involved in selling OTM options. Consequently, they seemed enormously profitable. Regulatory capital levels seemed remarkably healthy. And there was little information on the exact nature of bets taken. Few asked the key question, "why are we so lucky?"

They soon found out with a vengeance when housing prices collapsed in 2007, the over-leveraged financial sector experienced a large solvency shock, and the real economy experienced the most severe financial crisis since the Great Depression. Specifically, the collapse of the ABCP market in the third quarter of 2007 forced commercial banks to bring the assets held in their conduits back onto their balance sheets or otherwise support them. This hit banks like

Citigroup particularly hard and consumed Royal Bank of Scotland (which inherited the legacy of ABN Amro's conduits). Investment banks, which were not subject to the same capital requirements, held their CDOs on their books - but since investment banks, too, were typically funded overnight, they suffered the same maturity mismatch as did the commercial banks' off-balance-sheet conduits. By September 2008, investment-banking operations that had loaded up on AAA tranches of subprime mortgage-backed securities and their derivatives had effectively brought down UBS, Bear Stearns, and Lehman Brothers and threatened Merrill Lynch and Morgan Stanley.

While the post-Lehman phase has been the most difficult period of the crisis so far, in fact the first signs of the impending crisis can be traced nearly two years prior, with the bankruptcy of Ownit Solutions, a nonbank specialist in subprime and Alt-A (not-quite-prime) mortgages. From that point onward, there was a slow run on other non-bank non-prime mortgage lenders. Most of their loans were hybrid "2/28" or "3/27" adjustable-rate mortgages. These loans offered a fixed "teaser" rate for the first two or three years, and then adjustable rates for the remaining maturity of the mortgage. After the first two or three years, the adjustment of rates would be substantial enough to be unaffordable for subprime borrowers, so from the begining the mortgages were designed to be refinanced. But for the most part, this would be possible for subprime borrowers only if the collateral on the loan (i.e., the price of the house) had increased in value. Otherwise, they would be forced into default.

Because most of these mortgages were all originated around the same time, mortgage brokers and lenders had inadvertently created an environment that could lead to a systemic wave of defaults if the price of housing declined two or three years later, when the mortgages were scheduled to reset (Ashcraft and Schuermann, 2008; Gorton, 2008). Once the failure of lenders like Ownit Solutions (and major banks with US sub-prime businesses like HSBC) signaled that this had begun to happen, the short-term finance available to nonprime lenders dried up, and hundreds of specialists failed. The next wave of the crisis began on August 9, 2007, when three investment funds that were part of BNP Paribas, the French LCFI, could not determine the mark-to-market values of their securitized investments backed by subprime mortgages. This led to a suspension of redemptions by BNP Paribas, which in turn caused the asset-backed commercial paper market for conduits to "freeze-up." Purchasers of ABCP suddenly realized that assets backing the conduits were of such dubious quality that they might have little or no resale value, especially if they were all hit simultaneously with delinquencies and defaults (Acharya, Gale and Yorulmazer, 2008).

A year later, most of the assets funded by banks through securitized markets were hit by the same doubts, which ultimately brought down the investment banks that repackaged and warehoused subprime and other mortgages – as well as corporate, auto, and other loans—into structured securities. The failure of the likes of Bear Stearns and Lehman Brothers, which invested heavily in the securities created from of these mortgages, led to severe counterparty risk concerns that paralyzed capital markets (and even interbank lending markets) and thus caused the worldwide recession. Standing behind the mortally wounded wholesale banks was the systemic failure of securitization market, triggered by the popping of the overall housing bubble. And this in turn had been fueled by the ability of these firms, as well as commercial banks, to finance so much housing stock in the first place. The severity of the resulting recession and its worldwide scope has been magnified by the massive decline in lending by commercial banks, including most of the major names such as BNP Paribas, Citigroup, Royal Bank of Scotland, and UBS, as well as Bank of America, JPMorgan, and others, such as Wachovia, that no longer exist.

Contrary to the originate-and-distribute model, it was these same banks that turned out to be the main credit destinations for the mortgages originated by subprime lenders.

To summarize the genesis of it all, the root cause of the crisis was the desire of highly leveraged LCFIs to take even greater risks, generating even higher short-term "profits" than those associated with their role as financial intermediaries. They managed to do so by financing long-term, systematically risky assets such as mortgages using short-term, often overnight, debt. They further enhanced the "carry" by repackaging the risk in such a way as to get around the capital requirements imposed by regulators. This was the "new model" of LCFIs during 2003-07 – to manufacture and take on systemic risk or write deep out-of-the-money options, but do so with little capital on the balance-sheet – which ultimately led to the financial crisis of 2007-09.

IV. ALTERNATIVE EXPLANATIONS OF THE FINANCIAL CRISIS

There is no shortage of proximate causes of the financial crisis. We consider each of these in turn, and explain why most of them do not suffice to explain the spectrum of evidence available on what caused the financial crisis.

1. *Moral hazard in the originate-and-distribute model:* A commonly mentioned cause of the

crisis has been that the originate-and-distribute model of banking – the securitization model – destroyed incentives of loan originators, which led to the origination and distribution of poor quality mortgages. The conceptual point goes back at least to the work of Stiglitz (1992). For instance, in the buildup to the most recent crisis, there were mortgages granted to people with little ability to pay them back, and mortgages designed to systemically default or refinance in just a few years, depending on the path of house prices. There was the securitization of these mortgages, which allowed credit markets to grow rapidly, but at the cost of some lenders having little "skin in the game" and in turn contributing to the deterioration in loan quality (Dell'Ariccia, Igan and Laeven, 2008; Mian and Sufi, 2008; Berndt and Gupta 2008; Keys, Mukherjee, Seru and Vig, 2008). Finally, opaquely structured securitized mortgages were classified AAA by rating agencies prone to modeling failures and possible conflicts of interest between thorough risk assessment and generating fee income from security issuers.

Perhaps surprisingly, these are not the ultimate reasons for the near-collapse of the financial system. If bad mortgages sold to investors hoodwinked by AAA ratings were all there was to it, those investors would have absorbed their losses and the financial system would have moved forward. Although numerous investors would have been burned, the crash would have been no different, in principle, than the bursting of the tech bubble in 2000. In other words, the failure of the originate-and-distribute model might help explain why we saw poor quality mortgages, but it fails to explain why the mortgage risk ultimately did not leave the financial intermediaries responsible for originating and distributing them.

Since the AAA ratings indicated to investors that these tranches of "asset-backed" investments — collateralized debt obligations (CDOs) and collateralized loan obligations (CLOs) — were as safe as the safest possible non-sovereign debt instruments, the role of the rating agencies in this process should not be underestimated (White, 2006). Nevertheless, we believe that the rating agencies' role *in marketing asset-backed securities to investors* can be overstressed as a factor in the crisis because, in fact, investors were not the chief purchasers of these securities – the financial intermediaries or banks themselves were, as shown convincingly in Table 1. To repeat, instead of acting as intermediaries between borrowers and investors by transferring the risk from mortgage lenders to the capital market, the banks themselves became primary investors, and so it was not a true originate-and-distribute model that was at work but rather the new banking model of "originate-distribute-and-hold," incurring massive systemic tail-risks that ultimately brought the financial sector down.

2. *Good securitization or bad securitization?* Gorton (2008, 2009) provides an explanation of the financial crisis based on the idea that financial intermediation is intrinsically about financial institutions selling risk-free instruments that are essentially informationally insensitive to investors. However, adverse risks can materialize in the future which may make these instruments sensitive to information relating to the underlying assets, in which case investors "run" in order to enhance their redemption priority before other investors put in their claims and before there is a further deterioration of assets. This is the view that securitization growth during 2003-07 was inherently of the "good" type and therefore economically beneficial. For instance, the creation of AAA-rated tranches could be characterized as supplying investors with informationally insensitive securities. The growth in the wholesale credit market – the "repo" transactions in which banks borrow from each other against treasuries or relatively high quality assets, often on overnight basis – could also be viewed similarly in terms of creating liquidity flows that provide plumbing for securitized intermediation in the economy.

Gorton (2008, 2009) thus attributes the panic of 2007-09 as essentially a run on securitized banking - for instance, on the repo markets - due to the increase in risk in the underlying assets and counterparty risk among the financial intermediaries themselves. To Gorton's phraseology, these intermediaries were "slapped" by the invisible hands of the market suddenly recognizing that securities and transactions hitherto informationally insensitive had now turned informationally sensitive. As shown in Figure 10, the introduction of ABX indices tied to the quality of securities backed by US subprime assets deteriorated steadily during the Summer of 2007 and ignited fatal runs on securitized banking.

We do not contest the view that securitization can in principle be economically beneficial. Indeed, it seemed to have worked remarkably well until the most recent crisis erupted. We also do not dispute the view that a part of the financial crisis was a run on securitized banking. However, we have two fundamental points of departure from Gorton's "good securitization" view.

First, exposures of the financial sector to 50% of all AAA-rated sub-prime tranches, as shown in Table 1, is hard to square with the "good securitization" view. Securitization's purpose is to spread risks to end investors and away from the financial sector, rather than create "hot potatoes" (Shin, 2009) for circulation within the financial sector. Indeed, the classical theory of securitization (for example, Gorton and Pennacchi, 1990) argues that intermediaries should sell most or all of the "risk-free" tranches and hold back the information-sensitive first-loss tranches, which is what often happened as the securitized sector developed. This is in striking contrast to the securitization model financial intermediaries adopted during 2003-07, since they themselves held AAA-rated tranches. In terms used in international trade, they increased their focus on activities where they had a comparative disadvantage as against the informationally-sensitive activities where they had a comparative advantage, which makes no sense.

Second, the structure of ABCP conduits can be viewed as potentially consistent with the traditional view of securitization. In this view, banks sell guarantees to conduits in order to issue highly rated, short-term ABCP. However, as explained earlier, the guarantees were in fact 100% and were un-priced. That is, what happened was "securitization without risk transfer" (Acharya, Schnabl and Suarez, 2009) and guarantees were structured in a way that reduced and effectively eliminated regulatory capital requirements.

Contrary to this explanation of the crisis, our view is that the growth in securitization during 2003-07 was primarily of the "bad" type, in that it was directly contrary to the risk-transfer objective underlying traditional forms of securitization, and allowed banks to synthesize systemic tail risk without holding much capital against it.

3. *Global imbalances:* Many analysts of the financial crisis have singled out huge global imbalances as a primary cause of the crisis. Bernanke (2005) argued in a speech that the "savings glut" in Asia, most notably in China, and several European countries with current account surpluses such as Germany, had created severe and persistent global imbalances. These imbalances by and large found their way through capital flows into the US economy (Caballero, Farhi and Gourinchas, 2008). Importantly, unlike capital flows to emerging markets, a large share of these flows were subsequently invested in effectively risk-free assets such as US treasuries, US agency debt, and money market fund shares. Some observers (for example, Caballero and Krishnamurthy, 2009) have additionally argued that the appetite of surplus countries for risk-free assets left the US economy fragile by concentrating the real risks in its financial sector. Portes (2009), for example, recently wrote: "I maintain that global macroeconomic imbalances are the underlying cause of the crisis... The underlying problem in international finance over the past decade has been global imbalances, not greed, poor incentive structures, or weak financial regulation, however egregious and important these may be." Combined, these observations form the global imbalance explanation of the financial crisis of 2007-09.

It is certainly true that much capital has flowed to the United States. The reasons are many: a) The U.S. dollar's status as the reserve currency; b) The depth, liquidity and relative safety of U.S. financial markets; c) Relative demographics; d) Good institutions. The U.S. current account has been in deficit for twenty years and the size of the deficit has averaged more than 4% of GDP for at least ten years. But, it is very difficult to make a causal connection between capital flows and the financial crisis that is void of reliance on seeking of tail risks by LCFI's. The financial crisis seems to have arisen primarily due to this seeking of tail risks with capital flows linked to global imbalances having fueled that fire.

In particular, while global imbalances are clearly central to understanding the capital flows into the US economy, they fall short in explaining the financial crisis on two different dimensions. First, they fail to explain why the risk-free assets -- for example, the AAA-rated securities -- found their way into the balance-sheets of the US financial institutions (as shown in Table 1) rather than simply ending up in the asset holdings of surplus countries.

Second, Acharya and Schnabl (2009) explain that the global imbalances hypothesis does not coincide with the geography of the financial crisis -- in particular, why the crisis took such a global form right from its inception. Clearly financial institutions in the U.K. and the U.S., both deficit countries were the hardest hit in the crisis. But, financial institutions in Switzerland (UBS), the Netherlands (ABN Amro), and Germany (West LB, Deutsch Bank), all surplus countries were among the hardest hit. UBS was effectively a hedge fund that lost most of its capital in exposure to AAA-rated tranches of the US subprime assets; ABN AMRO was one of the largest creators of off-balance sheet conduits with liquidity guarantee provisions backed by little capital. And indeed, the first banks to collapse in the crisis due to exposure to ABCP markets were in Germany, a surplus nation. In August 2007, IKB and Sachsen Bank had to be bailed out. These banks had experimented investing in subprime assets in search of a new model following the withdrawal (forced by the European Union competition authorities) of the state guarantees on their liabilities. Thus, simply relying on global imbalances to explain failures in the financial sector proves to be grossly inadequate.

Further, many countries with large deficits as a percentage of GDP, such as Australia, Spain, Italy, were unscathed. What was the difference between countries that were hit hard and those that were not? The difference appears to be in the choices the banks and LCFIs made about what to take onto their balances sheets and the regulatory systems in place. Acharya and Schnabl (2009) explain for example that in spite of the housing price crash, banks in Spain have been reasonably well-buffered due to the prudent capital charge applied to off-balance sheet conduits that have recourse to bank balance-sheets and reserves-averaging in good times based on past asset growth (that served to restrict asset growth as well as create adequate capital buffers for a downturn affecting the quality of assets).

Figures 15-16 and Table 2 help illustrate these points. Table 2 in particular shows banks with the top-ten exposures to ABCP conduits, relative to their equity capitalizations, as of January 2007. This can be viewed as the extent of poorly capitalized off-balance sheet assets that banks took on.

Figure 15: ABCP and global imbalances, weighted by GDP
(Source: Acharya and Schnabl, 2009)

This figure shows the correlation between global imbalances, measured as the Current Account Deficit in 2006, and off-balance sheet activity, measured as ABCP as of 1/1/2007 relative to country GDP in 2006. The current account deficit data is from the OECD Economic Outlook. The GDP country data is from the OECD Statistical Database measured at prices and exchange rates of 2000. The ABCP data is based on Moody's data and only includes ABCP sponsored by commercial banks.

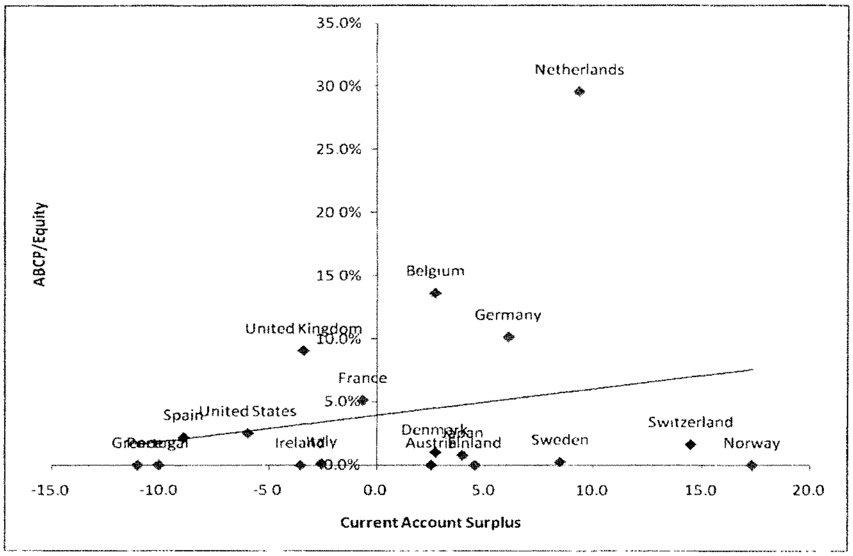
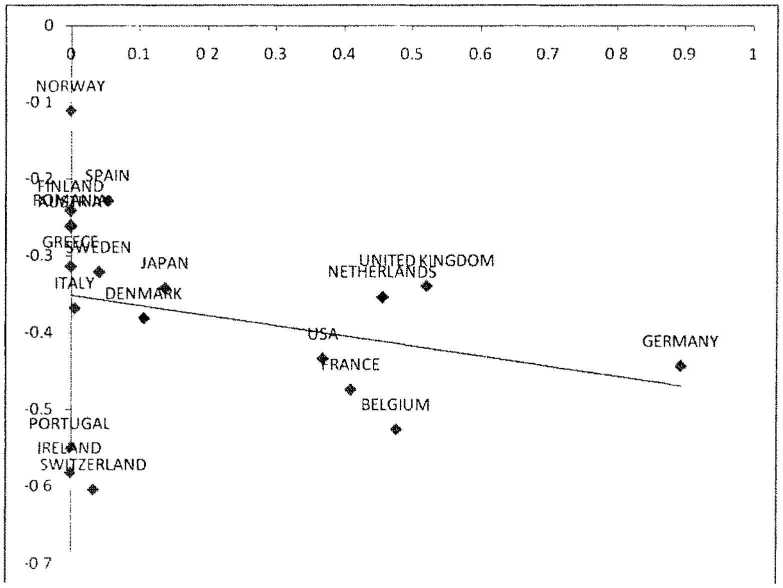


Figure 16: Stock Returns and ABCP from July 2007 to July 2008, by country (Source: Acharya and Schnabl, 2009)

This figure shows the correlation between global imbalances, measured as the Current Account Deficit in 2006, and off-balance sheet activity, measured as the asseet-weighted ABCP as of 1/1/2007 relative to equity per country. The current account deficit data is from the OECD Economic Outlook. The GDP country data is from the OECD Statistical Database measured at prices and exchange rates of 2000. The ABCP data is based on Moody's data and only includes ABCP sponsored by commercial banks.



	ABCP (bn)	Assets (bn)	Equity (bn)	ABCP/Equity
Citibank	93	1,884	120	77.4%
ABN Amro	69	1,301	34	201.1%
Bank of America	46	1,464	136	33.7%
HBOS	44	1,160	42	105.6%
JPMorgan Chase	42	1,352	116	36.1%
HSBC	39	1,861	123	32.1%
Societe Generale	39	1,260	44	87.2%
Deutsche Bank	38	1,483	44	87.8%
Barclays	33	1,957	54	61.5%
WestLB	30	376	9	336.6%

Table 2: Ten Largest ABCP sponsors and their off-balance sheet leverage relative to equity
Source: Acharya, Schnabl and Suarez (2009)

Table 2 shows that, of the top six banks, three were in surplus countries (WestLB and Deutsche Bank in Germany, ABN Amro in the Netherlands) and three were in deficit countries (HBOS in the UK, Société Générale in France and Citibank in the United States), with the top two among these banks being WestLB and HBOS. Figure 15 shows that, indeed, the average measure of ABCP exposure to equity for countries is unrelated to whether they were surplus or deficit nations, and if anything the relationship is positive. Germany, Belgium and Netherlands had the highest ABCP to equity exposure for banks in the period leading up to the crisis. Confirming this, Figure 16 shows that when the ABCP crisis broke out in August 2007, the average performance of banks at the country-level was again as bad for surplus nations as for deficit nations.

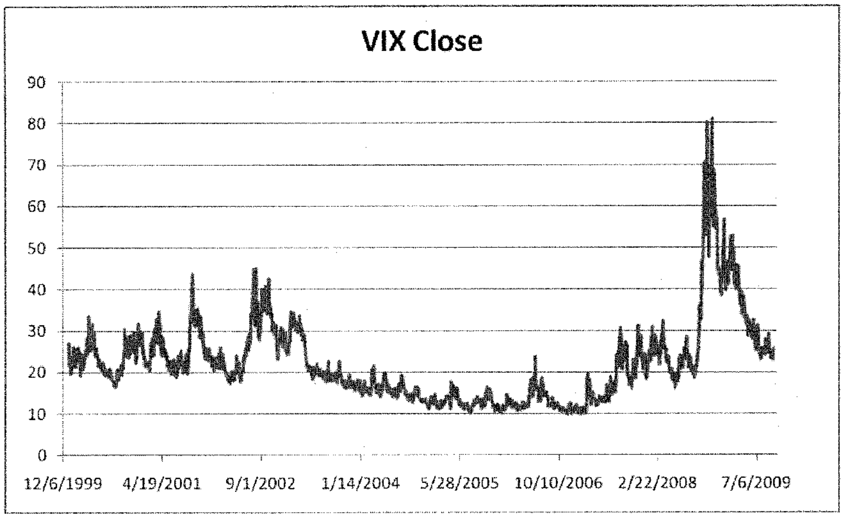
In short, the financial crisis may have been largely based on dubious quality of assets in the deficit countries, but there was a great deal of direct exposure to ABCP guarantees sold to these assets among banks in surplus countries as well. Any explanation of the financial crisis must come to grips with the propensity of the banks in surplus countries to manufacture tail risk in this manner. Global imbalances help in understanding the flow of capital across countries, but in a world of integrated financial sectors, global banks of surplus countries can themselves be exposed if they are poorly regulated and have incentives to take on assets of poor quality (being financed elsewhere by the imbalances).

Obstfeld and Rogoff (2009) present a more nuanced view that both the perpetuation of global imbalances and the occurrence of the financial crisis has common roots in loose monetary policies in the United States (and China's ability to maintain an underpriced currency), as discussed below. Note, however, that this common explanation – the loose monetary policy in the US – fails in explaining the geography of the financial crisis, as outlined in Figures 15-16 and Table 2.

4. *Mis-pricing of risk: The "false" belief in the Great Moderation and the "animal spirits":*

Akerlof and Shiller (2009) present perhaps the most authoritative endorsement of the view that there were strong psychological forces that led to the current financial crisis. They attribute the crisis both to the blind faith in ever-rising house prices and correspondingly plummeting faith in capital markets once the house prices crashed. There was certainly a widely shared view among macroeconomists in the decade prior to the crisis that a so-called "Great Moderation" had become established, a period with a genuine fall in macroeconomic volatility due to development of global capital markets and the risk-sharing that it provided (Stock and Watson, 2002). This was reflected in a downward revision of asset price volatility as shown in Figure 17 for levels of VIX, a measure of market volatility implied from short-term (30-day) option prices on the S&P 500 stock index. VIX typically ranged above 20% per annum prior to 2003, but almost always remained between 10% and 20% until the Summer of 2007. Within two years, it had jumped to an unprecedented level of 80%.

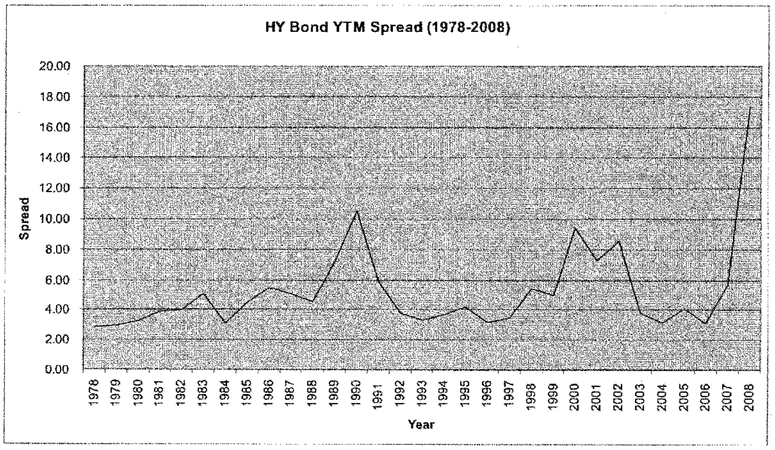
Figure 17: Behavior of VIX, the option-implied measure of volatility during 2000-2009 (Source: Chicago Board Options Exchange)



Akerlof and Shiller (2009) and other proponents of behavioral explanations of the financial crisis attribute the housing and the credit market boom to a misplaced faith in a permanent downward shift in volatility, or to markets in general being excessively euphoric in good times and failing to impose sufficient discipline on risk takers. In other words, the behavioral view of the financial crisis is simply that risks were mispriced and markets ignored early-warning signals that the housing market and the economy were overheated, fueling the boom instead through extraordinary valuations attached to both credit and equity instruments.

Such a view is not entirely unwarranted. Figure 18, for instance, graphs the high yield bond spread over Treasuries on an annual basis over the period 1978 to 2008. The lowest point in the graph, from June 1, 2006 onwards (not visible due to the annual nature of the data), is 260 basis points on June 12th 2007. This is remarkably close to the start of the crisis, indeed, just a few of weeks before Bear Stearns' hedge funds that invested in sub-prime securities ran into problems. As the graph shows, the high yield bond spread was essentially hovering around its historical lows for most of 2004-07, when the risks were in fact rising in the financial sector of the economy. Again, within two years, this spread jumped to the historic high of 1800 basis points.

Figure 18: Historical High Yield Bond Spreads (1978-2008)
Source: Salomon Center, Stern School of Business, NYU



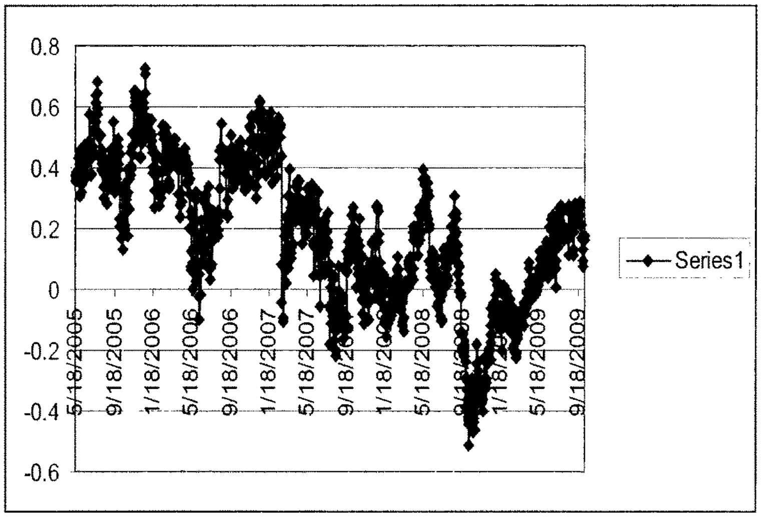
So why does the behavioral explanation fall short in explaining this particular episode? Note that housing assets cannot be easily short-sold. That is, a speculator wanting to express a negative view on the housing market cannot do so easily. Indeed, this became possible only a year prior to the crisis through development of trading in protection products on (ABX) indices linked to prices of asset-backed securities. Consequently, housing booms and busts are by and large a function of availability of credit in the economy. When there is a credit boom, housing prices rise substantially; and when there is a credit contraction, housing prices decline. It is imperative for the behavioral explanation to come to terms with reasons for and consequences of the credit boom and bust.

As explained in Section III, the financial sector had undertaken highly sophisticated structures in order to buy mortgages from originators, securitize them, partly sell them and hold the rest. If their own access to credit was very inexpensive or if they simply mispriced the risk of a housing crash, there would have been no need to increase their own leverage in funding the tremendous creation of housing finance that occurred. The financial sector had to simply expand its asset-base, and capital was readily available to do so (at abnormally low costs under the null of the behavioral hypothesis). But asset expansion was not simply a scaling-up of balance sheets. Instead, the asset-expansion was associated with a rise in the leverage of financial institutions, in particular through design of clever guarantees sold to ABCP conduits and slicing and dicing of risks to create AAA-rated tranches, which in turn helped reduce capital requirements. Consequently, the picture that emerges from the evidence in Section III is one of a financial sector eager to take on excessive leverage even in a world where equity capital was easily available. Furthermore, there is something internally inconsistent about bankers getting it all wrong as far as price of risk is concerned and yet getting it all right as far as reduction of capital requirements is concerned.

Finally, the leverage undertaken by the financial sector was essentially reflective of a severe short-term bias. Again, as explained in Section III, the leverage was constructed primarily through issuance of short-term asset-backed commercial paper (for commercial banks) or unsecured commercial paper (for investment banks). Since investors in such paper have the right to "run" on the issuing conduits or investment banks, the pricing of such debt is naturally dependent on short-term measures of volatility. Banks sponsoring conduits or holding the underlying long-term assets are however subject to short-term volatility. In particular, if risk rises, the short-term paper may not be rolled-over and the shortfall would have to be met by bank capital. Since the risk-taking model of modern banking during 2004-07 was built around constructing short-term carry and paying it out as profits, the long-run risks were ultimately ignored also by bank managers and their boards.

Figure 19 shows that the ratio of 2-year implied volatility from S&P 500 option prices was on average 30-40% higher than the short-term 1-month volatility over the period 2Q 2005-2Q 07. This upward sloping term-structure of volatility is typical during boom periods, when short-term volatility is low and long-term volatility is high, and inverts itself during stress times (as can be seen in the figure after the onset of the crisis). As noted by Engle (2009), long-run volatility should incorporate the possibility that the level of risk may change over time -- that is, rise from the current levels in boom times. This was indeed the case with market-observed long-term volatility. Hence, it is more likely that the financial sector at large ignored the long-term risks because it had incentives to do so, as discussed below.

Figure 19: Ratio of 2-yr at-the-money (ATM) S&P 500 implied volatility to 1-mth ATM volatility, i.e.,$\sigma_{2yr}/\sigma_{1mth} - 1$ (Source: Bloomberg)

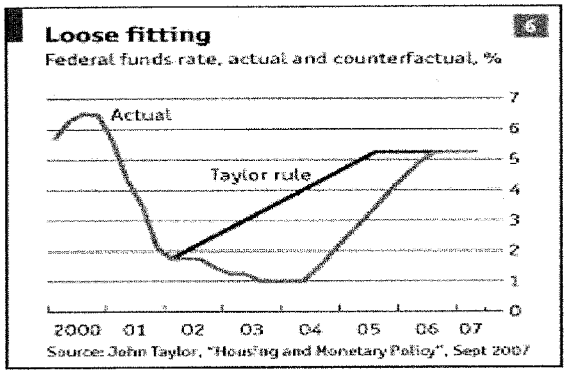


All of this still begs the question why there were such abrupt shifts in the market price of risk when the crisis took hold in August 2007. We conjecture that since most risks undertaken by the banking sector were through opaque over-the-counter and off-balance sheet positions, investors did not have the relevant information that disclosed regulatory capital levels of banks did not mean what they implied. When its hedge funds invested in sub-prime assets had to be bailed out by Bear Stearns, and BNP Paribas' hedge funds suspended redemptions on August 8 2007, the absence of a market for selling sub-prime asset-backed securities made it clear to investors that the entire financial sector had taken a one-way bet on the economy. Since that day, markets have in fact been right about most failures (of the shadow banking world, leveraged hedge funds, Bear Stearns, Lehman Brothers, Wachovia, Washington Mutual, etc.) with the exception of A.I.G., whose collapse and rescue in September 2008 was a surprise to most observers. We conjecture that market's failure in picking up AIG's woes was most likely due to opacity arising from the completely over-the-counter (and thus, largely unregulated and often undisclosed) nature of its credit default swap positions. Regulatory arbitrage exposes markets to unexpected outcomes, and most likely played a destabilizing role during 2004-09. It ultimately compromised market discipline in good times (2004-2Q 07) producing low cost of credit, so that the correction that took hold on the release of hidden information (3Q 2007-09) had to be larger and more severe.

5. *The Greenspan "put":* An important reason why asset-pricing bubbles may arise (even in the absence of "animal spirits") is due to the risk-shifting problem of leveraged households and financial institutions, coupled with the so-called "Greenspan put" - that when asset prices (such as house prices) decline, interest rates will be lowered by the central bank. An expected future reduction of interest rates will tend to raise asset prices, exacerbating the risk-shifting problem associated with the limited liability option in leveraged financing of assets. Allen and Gale (2000) explain in a simple model that if borrowing costs are insensitive to risks (e.g., due to government guarantees or opacity), then asset-pricing bubbles arising due to loose monetary policy can, in the limit, be explosive in nature. Taylor (2009) argues that the counter-factual interest rates based on the "Taylor rule" during the period 2002-05 far exceeded the low interest rates adopted by the US Federal Reserve after the recession of 2001-02 (see Figure 20). Taylor also shows that under this counterfactual, the housing price boom and bust that developed would probably not have materialized --"no boom, no bust". Obstfeld and Rogoff (2009) couple the loose monetary policy argument with global imbalances, implying that low interest rates in the

United States allowed it to continue with its foreign borrowing at low rates to maintain its macroeconomic imbalances and avoid tough policy decisions concerning the fiscal deficit.

Figure 20: Loose monetary policy of the United States (*The Economist,* 18 October 2007)



Loose fitting

Federal funds rate, actual and counterfactual, %

Source: John Taylor, "Housing and Monetary Policy", Sept 2007

By and large, the role played by loose monetary policy in fueling the housing price bubble is hard to dispute. Indeed, US monetary policy kept borrowing rates low not just for the households but also for the financial sector. Importantly, it made it attractive for banks from outside of the United States to borrow in US dollars and fund asset purchases in the US (Acharya and Schnabl, 2009). This does not necessarily explain why we ended up with a full-blown banking crisis, however. As we have stressed earlier, had the banks and LCFIs transferred the assets they created by lending down the quality curve – mainly sub-prime mortgages – on to end-investors, even the large negative shock arising due to popping of the housing bubble would not have resulted in a significant financial crisis. Consequently, we view loose monetary policy during 2002-05 as a primary candidate for sowing seeds of the economic crisis in the United

States, whereas the tail risk-seeking, regulatory arbitrage motives of the LCFIs as the primary explanation for the financial crisis.

6. *Liquidity crisis or solvency crisis?* Finally, we consider the classic debate whether

financial crises occur due to liquidity or solvency problems, in the context of this crisis. Allen and Gale (2007) build a series of economic models of financial crises in which depositors run on banks following the arrival of some adverse news about bank asset quality. The inability of banks to liquidate long-term assets at their fair values plays a crucial role in precipitating the crisis. Specifically, if the market among buyers of assets is segmented, or if there is not sufficient arbitrage capital set aside for asset purchases, then liquidation values reflect available cash in the market -- Allen and Gale call this "cash-in-the-market" pricing -- rather than fundamental values. In turn, the likelihood of such liquidations causes all depositors to run at once, since there will not be much long-run value in assets left post-liquidations. In other words, liquidity problems in the market for assets exacerbate the problem caused by adverse news about those assets.

Figure 21 shows that the market indeed had adverse information about asset quality. The figure graphs the de-meaned value of the ratio of the Office of Federal Housing Enterprise Oversight (OFHEO) repeat-sale house price index to the Bureau of Labor Statistics (BLS) shelter index (i.e., gross rent plus utilities components of the CPI). Because of de-meaning, the average value of this ratio is zero. As is clear that the peak is reached in 2006 at a value of 0.3 but thereafter the ratio declines sharply. Thus, prior to outbreak of the crisis in Summer of 2007, there was certainly credible adverse evidence about the value of the underlying housing assets (see also Figure 14 on the time-series of ABX indices).

Figure 21: House Price to Rent Ratio (1975-2008)
Source: Own calculations, OFHEO, BLS

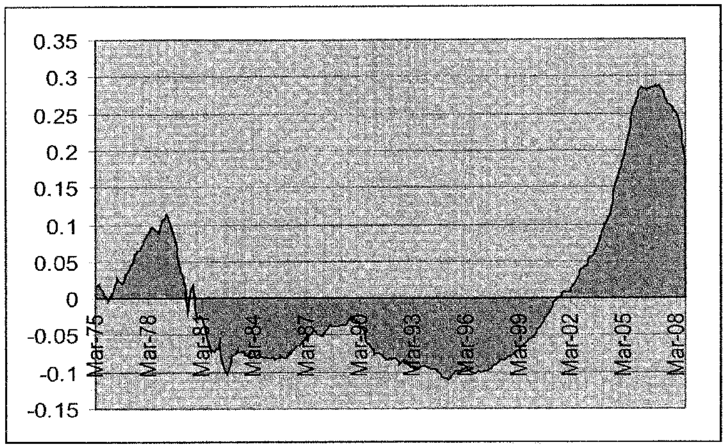
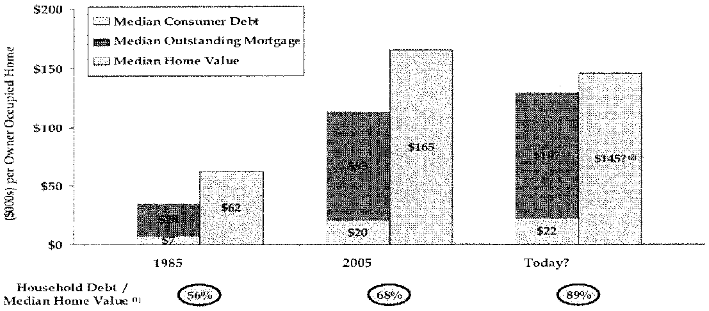


Figure 22: Household Debt/Home Values (1985, 2005, 2008)
Source: U.S. Census Bureau, Federal Reserve Flow of Funds, S&P Case-Shiller Index.



2

What made the housing price shock primarily a solvency issue was the high leverage in both the household sector and the financial sector. Figure 22 graphs estimates of household debt over home values of the median household. The median value of outstanding mortgage principal amount of owner-occupied units and the consumer credit per household was derived from the U.S. Census Bureau and Federal Reserve Flow of Funds, and the 2008 median home value was adjusted from the 2005 fourth quarter value using the Case-Shiller National Home Price Index. The ratio of household debt to home values stood at a remarkable 89% in 2008 compared to just 68% in 2005, and 56% twenty years earlier, in 1985. Similarly, Table 1 showed that the financial sector was likewise significantly exposed to housing values.

So right from its inception, the financial crisis of 2007-09 appears to have been a crisis of solvency not just for the household sector but also for the financial sector. It is indeed the case that when a large number of economic agents de-lever at once, market prices will reflect liquidity discounts (Allen and Gale, 2007) and short-term creditors will "run" as debt capacity of assets deteriorates due to the market-driven discounts (Acharya, Gale and Yorulmazer, 2008). Nevertheless, the primary cause of both of these problems is the need to de-lever and the fact that the leveraged agents are all on the same side of the trade. We therefore believe that the "liquidity problems" witnessed in this crisis, while clearly a symptom of some market segmentation and mark-to-market treatment in regulatory capital buffers of banks, they ultimately were connected to at least some solvency problems.

The root cause of the crisis as a solvency problem of households and the financial sector is perhaps one explanation for why the highly innovative liquidity injection facilities created by the Federal Reserve (and other Central Banks) in its lender-of-last-resort function did not ultimately succeed in stemming the crisis. Between Fall 2007 and Dec 2008, the Federal Reserve effectively created backstop facilities for most kinds of assets that experienced stress in the crisis; it provided longer-term lending facilities against the highest-quality collateral, extended discount window to securities firms and investment banks, lent against high-quality illiquid asset-backed securities, lent for purchases of ABCP and unsecured CP, provided liquidity to money market funds, and purchased assets of the GSE's. These were liquidity-targeted measures, and were unlikely to save the day if the underlying problem was insolvency. Indeed, any balance-sheet restructuring or solvency stress tests occurred only after 14 months into the crisis, following the failure of Lehman Brothers in mid-September 2008. At that stage the crisis had already taken fully systemic proportions.

In fact, some of the markets the central banks attempted to restore through liquidity injections – such as illiquid mortgage-backed securities – continue to remain moribund over two years after the onset of the crisis due to the substantial overhang of debt and poor quality assets on the financial sector's balance-sheets. As an illustration of this point, consider Figure 14 again which shows the price behavior of ABX of AAA-rated subprime tranches issued in first and second halves of 2006 and 2007. The plot shows that in spite of the significant economic and financial stimulus, and government backing to support leveraged purchases of these assets, the tranches have recovered little as of February 2010, especially the tranches based on 2007 assets. From their lows of 20-30 cents on a dollar, these tranches have only recovered about 10 cents, highlighting that even fifteen months after bank recapitalizations these assets' prices remain depressed relative to par. This is strongly suggestive of poor cash flow realizations and quality of underlying mortgages rather than of a persistent liquidity discount.

Some of the worst assets, originated in 2006 and 2007, were taken over by regulators (explicitly or through government back-stops) while rescuing Bear Stearns and Citigroup, and are generating losses even to date on the regulators' books. Financial Times, February 16 2010 ("Bear property losses weigh on Fed") reports that the US Federal Reserve is sitting on significant paper losses on the real estate assets in its Maiden Lane I portfolio acquired in the Bear Stearns rescue in March 2008, with much of the red ink coming from debt used to back some of the most high-profile buyout deals of the bubble years (e.g., Hilton Hotels which is being restructured and Extended Stay which is in bankruptcy). The assets – all of which came from Bear's mortgage desk – were originally valued at $30bln and at the end of 2009, they were said to be worth $27.1bln, about 10% loss, in spite of the economic stimulus and recovery. Commercial real estate holdings fell from $7.7bln valuation to $4bln. "It was the scrapings off the slaughterhouse floor. It started with the things that were not good enough to get securitized". While the Fed Chairman Ben Bernanke insists that they will ultimately not make losses on these portfolios, the temporary valuations of these assets have not yet rebounded, suggesting that the worst assets might be sitting in regulatory balance-sheets, masking the true profitability of the banking sector portfolio from pre-Lehman days.

V. CONCLUSION

We have argued in this essay that there was a fundamental shift in the business model of large, complex financial institutions during the period of 2003-2Q2007. This new business model led to their "manufacturing" tail risks that were systemic in nature. This involved, inter alia, selling deep out-of-the-money guarantees to off-balance sheet vehicles and holding little capital against them, or warehousing AAA-rated tranches of subprime mortgage-backed assets and financing their purchase with deposits and short-term commercial paper. They did this without sufficient capital to back the associated market, credit and liquidity risk exposures. We conclude that the propensity of LCFIs to take on these risk exposures reflected an overriding risk-shifting incentive. The specific forms of this involved the use of complex innovations to arbitrage regulatory capital requirements.

While conclusive empirical evidence explaining the cause of such a shift in the banking model is worth pursuing, the history of bank regulation and the dynamics of the financial intermediation business itself suggest that there are several contributing factors. These include (a) increased competition which has eroded the profit margins in the traditional banking model and thus the "franchise value" of banks, (b) explicit or implicit provision of government guarantees without appropriate charges or fees for the insurance cover implied and without ring-fencing of guarantees for the originally intended purposes, and (c) a passive regulatory stance towards the arbitrage of capital requirements on the part of the financial intermediaries themselves. The erosion of franchise values made it attractive for LCFIs to increase leverage. Mis-priced government guarantees and lack of ring-fencing meant that tail risks could be manufactured without affecting the cost of funding. The lax enforcement of capital requirements allowed these tail risks to be retained on- or off-their balance sheets. Macroeconomic factors such as low interest rates in the US and large capital flows into trade-deficit countries such as the US and the UK undoubtedly amplified the inherent propensity for seeking tail-risk in the financial sector.

Our recommendations in Acharya, Cooley, Richardson and Walter (2010a, b) for reforming financial sector regulation directly address some of these underlying drivers. Below we provide a brief summary of our proposals:

First, systemic financial intermediaries like LCFIs must be charged fees (effectively insurance premiums) commensurate with the explicit or implicit government insurance they enjoy on a continuous basis, and not just when resolution funds have been depleted in crisis situations. These insurance premiums would be explicitly linked to their overall risk profiles and insured deposit base -- as well as to their total leverage given the likelihood of ex-post forbearance when large players fail.

Second, there should be an additional fee or premium that is tied specifically to the systemic risk of banks and other LCFIs given the reality that systemic failures are associated not just with ex-post forbearance but also with significant negative externalities bearing on the rest of the financial sector and the real economy. While systemic risk is difficult to quantify, a start needs to be made in this direction.

Third, it must be recognized that charging of such fees or insurance premiums depends inherently on the regulatory assessment of risk. Even with market-based data and good supervisory intelligence, macro-prudential risk assessment might well be imperfect, since there are always internal issues related to capital and risk allocations whose consequences are not fully reflected or visible, even at the level of their own boards and much less to outside stakeholders. To this end, some discipline that is based on realized outcomes is necessary. This might be some type of "contingent capital" that could for example take the form of debt that automatically converts into equity when bad firm-level or systemic states materialize. There are plenty of alternatives of this nature that could be helpful.

Finally, it is worth considering -- whether by regulatory fiat or through appropriate capital charges -- if a form of functional separation or carve-outs needs to be enforced, as is being advocated, by Paul Volcker, Mervyn King, and others who are deeply skeptical about the efficacy of finely-tuned regulation of financial firms that have time and again proven their skill at regulatory avoidance and arbitrage. This separation would carve out the traditional banking and intermediation activities of lending and underwriting from the more risk-prone activity of proprietary trading or effectively running an in-house hedge fund, which are the likely "manufacturing" centers for tail risk and systemic instability. Enforcing or inducing a separation of this type might well erode some economies of scope between hedging and trading activities at banks and other LCFIs. In return, it could render more tractable the immense moral hazard problem arising from accordance of government guarantees and the inevitable opacity and complexity associated with financial innovations aimed at exploiting loopholes and undermining systemic safety and soundness. Functional separation may well be a small price to pay for enhanced robustness of the financial system.

Appendix: Tail Risk in the Rest of the World

Over the years there has been a great deal of debate about the relative properties of alternative financial systems around the world: How do they differ from one another, and how do they compare in achieving what financial systems are supposed to achieve in terms of the public interest – an optimum combination of efficiency, innovation and global competitiveness, balanced against stability and robustness? Financial systems do indeed differ widely among national financial systems in terms of the role of universal banks and financial conglomerates, specialized financial intermediaries of various kinds, government-owned and hybrid financial services providers, financial cooperatives and the like. The financial crisis of 2007-09 provides an unusual opportunity to perform a robustness check into the resilience of financial systems in terms of their inherent fragility, propagation of financial shocks and their transmission to the real sector of the economies.

The available date on write-downs of impaired assets that are at the center of the crisis suggest that non-US financial intermediaries were as involved as their US competitors in taking losses (Exhibit 1). By the end of 2006 and the onset of the crisis, a small number of non-US banks had pushed into the upper brackets of the fixed-income origination league tables – notably Deutsche Bank AG, UBS AG and Credit Suisse. As the volume of fixed-income originations shifted to asset-backed securities (ABS) and mortgage-backed securities (MBS) as well as collateralized debt obligations (CDOs) and related instruments, one would expect these firms to have also taken on "pipeline" exposures to these instruments comparable to American firms like Merrill Lynch and Citigroup. The incentive for these non-US wholesale intermediaries – all of whom are universal banks or financial conglomerates – to invest in these securities and assume warehouse risk exposures would have been the same as for the US firms. In fact, in some cases such as UBS the incentive could have been even greater due to the abnormally low cost of funds attributable to the large private banking divisions. Consequently, as confirmed by Exhibit 1, in the losses taken by the big wholesale financial intermediaries as of late-2009 the major European players featured no less than their American rivals.

Beyond the key originators and intermediaries were the banks that engaged minimally in the intermediation process but principally took on the role of investors in what ultimately became damaged assets. Again, Exhibit 1 shows that over half of the top-50 losers were non-US banks.

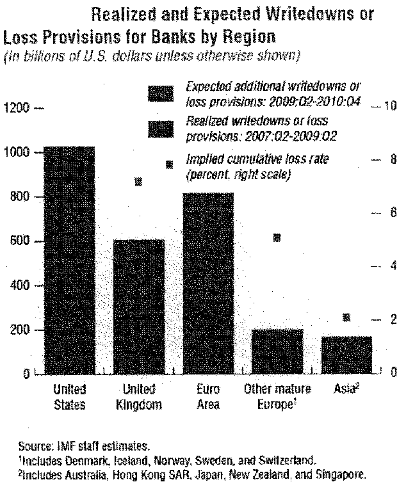
A number of these (most notably, ABN AMRO, HBOS and IKB) had set up off balance sheet vehicles (conduits and SIVs) to avoid the capital requirements associated with this exposure. Northern Rock that collapsed in September 2008 in the UK was also heavily reliant on wholesale asset-backed paper and had grown its mortgage book multi-fold with little growth in retail deposit base. When the crisis hit, these banks took large losses (in some cases arguably larger than indicated due to less conservative marks as to their value) and could not roll over their leverage as they had arranged little capital buffer to guard against the underlying credit and rollover risks. Exhibit 2 shows the IMF's estimates of the magnitude of those losses realized as of 2009 (Q2) and the expected write-downs through the end of 2010, showing European losses to be far higher than American losses.

The losses booked so far and the apparent difference in marked asset valuations between the US and Europe suggests further pain for the surviving institutions. Exhibit 3 estimates the additional capital that would have to be raised by individual European banks to reach 4% and 5%, respectively, of risk-weighted assets under the Basle 2 standards. This assessment is broadened in Exhibit 4 to banks home-based in specific European countries, according to IMF estimates in October 2009. It is clear from this last exhibit that if the US marks prove to be more accurate than the continental European marks, then the European banks will have a great deal of capital raising to do given the significant tail risk of real estate and the global economy at large to which they built exposures leading up to the crisis.

Exhibit 1
Exposure Write-Downs and Capital Raised (in billion dollars) as of October 2009
Source: Bloomberg

Firm	Loss	Capital
Wachovia Corporation	101.9	11
Citigroup Inc.	88.3	109.3
Merrill Lynch & Co	55.9	29.9
UBS AG	50.6	32.9
Washington Mutual Inc.	45.3	12.1
Bank of America Corp.	42.7	78.5
HSBC Holdings Plc	42.2	23.5
JPMorgan Chase & Co	33.3	44.7
HBOS Plc	25.7	22.4
National City Corp.	25.2	8.9
Wells Fargo & Company	23.4	41.8
Morgan Stanley	21.5	24.6
Royal Bank of Scotland	20.7	48.5
Deutsche Bank AG	16.4	5.9
Lehman Brothers Holdings	16.2	13.9
Bayerische Landesbank	16.1	20
Credit Suisse Group AG	15.8	11.9
Barclays Plc	14.2	26.8
ING Groep N.V.	14	19.4
IKB Deutsche Industries	13.9	11.4
Societe Generale	8.9	11.1
Fortis	8.9	21.7
Credit Agricole S.A.	7.7	12
Natixis	7.7	7.8
BNP Paribas	7.6	3.4
Mizuho Financial Group	7.5	8.2
Canadian Imperial Bank	7.3	2.5
PNC Financial Service	7.2	8.1
Goldman Sachs Group	7.1	20.5
DZ Bank AG	7	0
Dexia SA	6.2	8.6
KBC Groep NV	6.2	7.4
SunTrust Banks Inc	6.1	4.9
UniCredit SpA	6	10.1
Bank of China Ltd	5.9	0
Other Asian Banks	5.5	16.9
Other European Banks	5.5	4.5
Hypo Real Estate Holdings	5.4	0
Indymac Bancorp	5.2	0

Exhibit 2



Realized and Expected Writedowns or Loss Provisions for Banks by Region

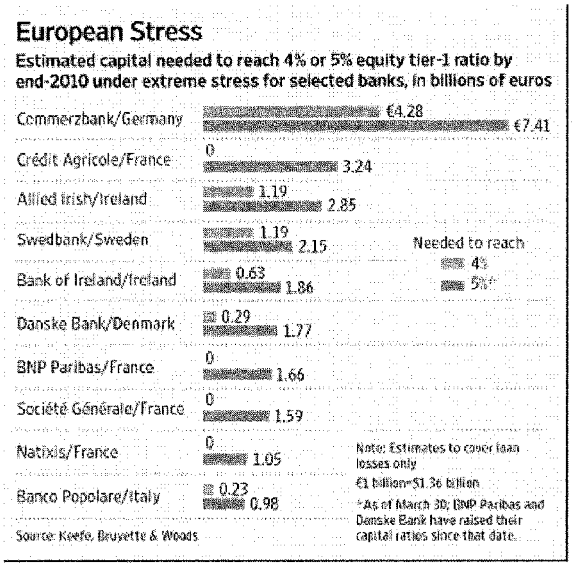
(in billions of U.S. dollars unless otherwise shown)

Source: IMF staff estimates.

¹Includes Denmark, Iceland, Norway, Sweden, and Switzerland.

²Includes Australia, Hong Kong SAR, Japan, New Zealand, and Singapore.

Exhibit 3 (Source: International Monetary Fund, Global Financial Stability Report, April 2009)



European Stress

Estimated capital needed to reach 4% or 5% equity tier-1 ratio by end-2010 under extreme stress for selected banks, in billions of euros

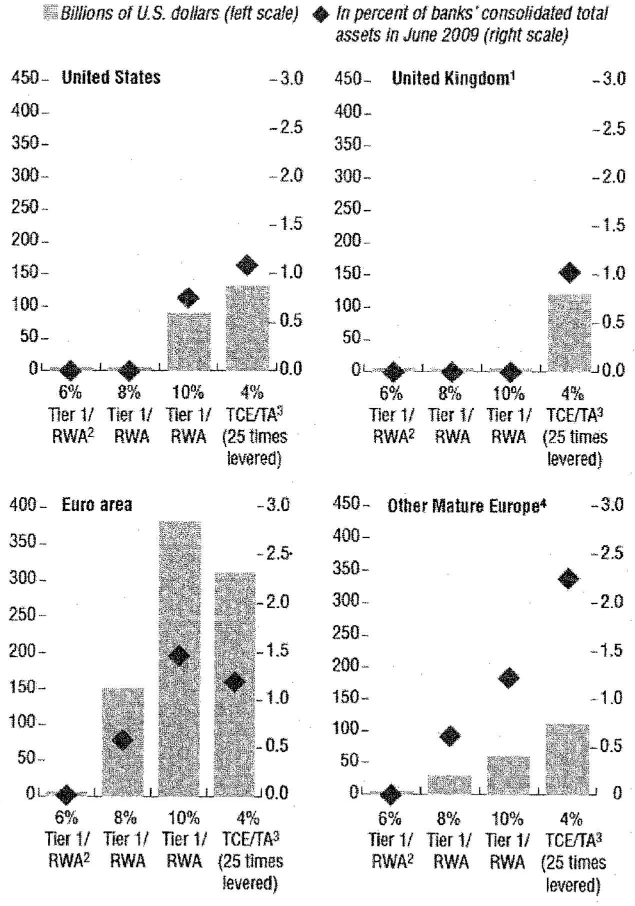
Note: Estimates to cover loan losses only

€1 billion=$1.36 billion

*As of March 30; BNP Paribas and Danske Bank have raised their capital ratios since that date.

Source: Keefe, Bruyette & Woods

Exhibit 4
Estimates Additional Capital Raising Needed to Reach Specific Targets



Source: IMF staff estimates.

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- UBS, 2008, “Shareholder Report on UBS’s Write-Downs”.
- Lawrence J. White, 1991, *The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation*, Oxford University Press.
- White, Lawrence J., 2006, "Good Intentions Gone Awry: A Policy Analysis of the SEC's Regulation of the Bond Rating Industry," Policy Brief #2006-PB-05, Networks Financial Institute, Indiana State University.

VIRAL V. ACHARYA
Professor of Finance (2008-), Faculty Council Member (2009-), Research Appointments Task Force (2010-)
New York University – Stern School of Business, 44 West 4th St., Suite 9-84, New York, NY – 10012, USA.
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General Indian, Born on 1st March 1974, Married

Education Ph.D. Finance, Stern School of Business, New York University, 1996 – 2001
- Dissertation - "Essays in Banking and Financial Institutions"

Ph.D Computer Science (Incomplete), New York University, 1995 – 1996
B. Tech. in Computer Science and Engineering, IIT Bombay, 1991 – 1995
- President of India Gold Medalist for the highest GPA among 350 students.
- President of India Gold Medalist for the best academic and overall proficiency.
- Ranked 5th all over India at IIT Joint Entrance Exam, 1991.

Academic Appointments
Initiative on Global Markets (IGM) Visitor (May 2009), University of Chicago, Booth School
Professor of Finance (2007-2009), London Business School
Visiting Professor of Finance (Winter 2007), Graduate School of Business, Stanford University
Associate Professor of Finance with tenure (2005-2006), London Business School
Assistant Professor of Finance (2001-2005), London Business School

Other Positions
- Research Associate, National Bureau of Economic Research (NBER) in Corporate Finance, 2009-
- Research Affiliate, Center for Economic Policy Research (CEPR), 2002-
- Research Associate, European Corporate Governance Institute (ECGI), 2009-
- Member of the Research Advisory Board of the British Private Equity and Venture Capital Association, Fall 2008-
- Academic Advisor to the Federal Reserve Bank of New York and Member of the Liquidity Working Group (Jan 2009-), Philadelphia (Jan 2009-), Cleveland (May 2009-), Board of Governors (Fall 2010-)
- Academic Panel Member, the International Centre for Financial Regulation, 2010-
- Academic Director, Coller Institute of Private Equity at London Business School, 2007-09
- Senior Houblon Norman Fellow at the Bank of England (July-August 2008)
- Academic Advisor to the Bank of England (Dec 2004-June 2008)
- Visiting Scholar, International Monetary Fund, August 2006
- Member – American Finance Association, Western Finance Association, European Finance Association, Financial Intermediation Research Society, European Corporate Governance Institute, Society of Financial Econometrics (SoFiE), Volatility Institute

Awards
- Excellence in Refereeing Award, *American Economic Review*, 2009.
- Finalist/Honorable mention for *Restoring Financial Stability. How to Repair a Failed System* (co-edited with Matt Richardson), John Wiley & Sons, at the PSP/PROSE 2009 awards of the Association of American Publishers in Business, Finance and Management
- L. Glucksman Institute (NYU Stern) Best Paper Award for 2009-10 – "Rollover Risk and Market Freezes"
- Best Paper Award (Viz Risk Management Prize on Energy Markets, Securities, and Prices) at the European Finance Association Meetings, 2009 – "Limits to Arbitrage and Hedging: Evidence from Commodity Markets"
- Distinguished Referee Award from the Review of Financial Studies, 2009
- III Jaime Fernandez de Araoz Corporate Finance Award, 2009 – "The Internal Governance of Firms"
- Best Paper on Corporate Governance awarded by the European Corporate Governance Institute, 2008 – "Corporate Governance Externalities"

- Journal of Financial Economics Best Paper in Capital Markets and Asset Pricing, Second (Fama/DFA) Prize, 2007 – "Does Industry-wide Distress Affect Defaulted Firms? – Evidence from Creditor Recoveries"
- The "Rising Star in Finance" Award at the Inaugural Rising Stars Conference in Albany organized by Rennslear Polytechnic Institute (RPI), 2008.
- Citibank Best Paper Award at the Summer Research Conference of the Center for Analytical Finance (CAF) at Indian Business School, 2007 – "Bankruptcy Codes and Innovation"
- Second Runner-up Award for the Best Paper at the 13th Mitsui Life Symposium on "Value Creation: Financing and Organizing the Firm" at the University of Michigan, 2007 – "Bankruptcy Codes and Innovation"
- Journal of Financial Economics Best Paper for Capital Markets and Asset Pricing, First (Fama/DFA) Prize, 2005 – "Asset Pricing with Liquidity Risk"
- First recipient of the Lawrence G. Goldberg Prize for the Best Ph.D. in Financial Intermediation, 2005
- Outstanding Referee Award for the Review of Financial Studies, 2003
- NYSE Award for Best Paper on Equity Trading, WFA Meetings, 2003 - "Asset Pricing with Liquidity Risk."
- Best Student Paper Award at FMA European Conference, 2001 - "Is the International Convergence of Capital Adequacy Regulation Desirable?"
- Journal of Financial Economics Best Paper for Corporate Finance and Organizations, First (Jensen) Prize, 2000 - "On the Optimality of Resetting Executive Options."
- Lehman Brothers Fellowship for Excellence in Finance Research - First Prize, 2000 (Awarded to a graduating student across MIT, Harvard, NYU, Columbia, Wharton, and Chicago) - "A Theory of Systemic Risk and Design of Prudential Bank Regulation."
- L. Glucksman Institute Research Awards, NYU Stern - First Prize (2002-2003, 1998-1999), Second Prize (2000-2001), and CDC Working Paper Awards, NYU Stern - First Prize, 2003, 2000, 1999
- Harold W. MacDowell Award for Outstanding Achievement in Doctoral Program, Stern School of Business, NYU, 2001

Research

Areas of Interest

- Banking – Liquidity, Crises, Systemic Risk, Regulation, Diversification of Loan Portfolios.
- Corporate Finance – Cash Management, Incentive Compensation, Bankruptcy Systems, Private Equity and Corporate Governance.
- Asset Pricing – Causes and Effects of Liquidity Risk, Disclosure and Insider Trading.
- Valuation and Hedging of Corporate Debt and Credit Derivatives.
- International Finance – Law, Innovation, Growth and Crises.
- General Equilibrium – Agency and Default.

Publications

- "Creditor Rights and Corporate Risk-taking" with Yakov Amihud and Lubomir Litov, *forthcoming, Journal of Financial Economics.*
- "Leverage, Moral Hazard and Liquidity" with S. Viswanathan, *forthcoming, Journal of Finance.*
- "Crisis Resolution and Bank Liquidity" with Hyun-Song Shin and Tanju Yorulmazer, *forthcoming, Review of Financial Studies*
- "Do Global Banks Spread Global Imbalances? The Case of Asset-Backed Commercial Paper during the Financial Crisis of 2007-09" with Philipp Schnabl, *forthcoming, IMF Economic Review.*
- "Causes of the Financial Crisis" with Matthew Richardson, 2009, *Critical Review,* 21(2–3): 195–210.
    - Reprinted as Chapter 7. "How Securitization Concentrated Risk in the Financial Sector." In Jeffrey Friedman, ed., *The Causes of the Financial Crisis,* University of Pennsylvania Press, 2010.
- "Systemic Risk and Deposit Insurance Premiums" with Joao Santos and Tanju Yorulmazer, *forthcoming, Economic Policy Review, Federal Reserve Bank of New York.*
- "Finance and Efficiency: Do Bank Branching Regulations Matter?" with Jean Imbs and Jason Sturgess, *forthcoming, Review of Finance.*

- "More Insiders, More Insider Trading: Evidence from Private Equity Buyouts" with Timothy Johnson, *forthcoming, Journal of Financial Economics*
- "Cross-country Variations in Capital Structures: The Role of Bankruptcy Codes," with Kose John and Rangarajan K. Sundaram, *forthcoming, Journal of Financial Intermediation*
- "Corporate Governance Externalities" with Paolo Volpin, *Review of Finance,* 14(1), 2010, 1-33 (lead article).
- "A Theory of Systemic Risk and Design of Prudential Bank Regulation", *Journal of Financial Stability,* 5(3), 2009, 224-255
- "Bankruptcy Codes and Innovation" with Krishnamurthy Subramanian, 2009, *Review of Financial Studies*, 22(12), 4949-4988.
  - ➢ "Bankruptcy Codes and Innovation: A Model" with Krishnamurthy Subramanian, theoretical appendix to the above paper, online at *Review of Financial Studies*.
- "Managerial Hedging, Equity Ownership, and Firm Value" with Alberto Bisin, *Rand Journal of Economics,* 40(1), 2009, 47-77.
- "Private Equity versus Plc Boards in the U.K.: A Comparison of Practices and Effectiveness" with Conor Kehoe and Michael Reyner, *Journal of Applied Corporate Finance,* 21(1), 2009, 45-56
- "Cash-in-the-Market Pricing and Optimal Resolution of Bank Failures," with Tanju Yorulmazer, *Review of Financial Studies,* 21, 2008, 2705-2742.
  - ➢ Reprinted in *Handbook on Liquidity and Crises,* Franklin Allen, Elena Carletti, Jan-Pieter Krahnen and Marcell Tyrell, eds., Oxford University Press, forthcoming.
- "Information Contagion and Bank Herding" with Tanju Yorulmazer, *Journal of Money, Credit and Banking,* 40(1), 2008, 215-31.
  - ➢ Reprinted in *Handbook on Liquidity and Crises,* Franklin Allen, Elena Carletti, Jan-Pieter Krahnen and Marcell Tyrell, eds., Oxford University Press, forthcoming.
- "Is Cash Negative Debt? – A Hedging Perspective on Corporate Financial Policies" with Heitor Almeida and Murillo Campello, *Journal of Financial Intermediation,* 16(4), 2007, 515-554.
- "Does Industry-wide Distress Affect Defaulted Firms? - Evidence from Creditor Recoveries," with Sreedhar Bharath and Anand Srinivasan, *Journal of Financial Economics,* 85(3), 2007, 787-821.
- "Too-Many-To-Fail – An Analysis of Time-inconsistency in Bank Closure Policies," with Tanju Yorulmazer, *Journal of Financial Intermediation,* 16(1), 2007, 1-31 (lead article).
- "Insider Trading in Credit Derivatives," with Timothy Johnson, *Journal of Financial Economics,* 84(1), 2007, 110-141.
- "Private Equity: Boom and Bust?" with Julian Franks and Henri Servaes, *Journal of Applied Corporate Finance,* 19(4), Fall 2007, 44-53.
- "When Does Strategic Debt-Service Affect Debt Spreads?" with Jing-zhi Huang, Marti G. Subrahmanyam, and Rangarajan K. Sundaram, *Economic Theory,* Feb 2006, 1–16.
- "Should Banks Be Diversified? Evidence from Individual Bank Loan Portfolios," with Anthony Saunders and Iftekhar Hasan, *Journal of Business,* May 2006, 79(3), 1355-1412.
- "Optimal Financial-Market Integration and Security Design," with Alberto Bisin, *Journal of Business,* 78(6), 2006, 2397-2433.
- "Asset Pricing with Liquidity Risk," with Lasse Pedersen, *Journal of Financial Economics,* 77(2), 2005, 375-410.
- "Is the International Convergence of Capital Adequacy Regulation Desirable?" *Journal of Finance,* 58(6), 2003, 2745-2781.
- "Corporate Bond Valuation and Hedging with Stochastic Interest Rates and Endogenous Bankruptcy," *Review of Financial Studies,* 15(5), 2002, 1355-1383 with Jennifer N. Carpenter.
- "Pricing Credit Derivatives with Rating Transitions," *Financial Analysts Journal,* 58(3), 2002, 28-44, with Sanjiv R. Das and Rangarajan K. Sundaram.
- "On the Optimality of Resetting Executive Stock Options," *Journal of Financial Economics*, 57(1), 2000, 65-101, with Kose John and Rangarajan K. Sundaram.

Papers under revision

- "The Internal Governance of Firms" with Stewart Myers and Raghuram Rajan *(being revised for resubmission, Journal of Finance).*

- "Rollover Risk and Market Freezes" with Douglas Gale and Tanju Yorulmazer *(being revised for resubmission, Journal of Finance).*
- "A Theory of Slow-Moving Capital and Contagion" with Hyun-Song Shin and Tanju Yorulmazer *(being revised for resubmission, Review of Economic Studies).*
- "Corporate Governance and Value Creation: Evidence from Private Equity" with Moritz Hahn and Conor Kehoe *(resubmitted, Review of Financial Studies).*
- "Endogenous Information Flows and the Clustering of Announcements" with Peter DeMarzo and Ilan Kremer *(being revised for resubmission, American Economic Review)*
- "Imperfect Competition in the Inter-Bank Market for Liquidity as a Rationale for Central Banking" with Denis Gromb and Tanju Yorulmazer *(being revised for resubmission, American Economic Journal - Macroeconomics).*

Submitted papers
- "Securitization Without Risk Transfer" with Philipp Schnabl and Gustavo Suarez.
- "Limits to Arbitrage and Hedging: Evidence from Commodity Markets" with Lars Lochstoer and Tarun Ramadorai.
- "Wrongful Discharge Laws and Innovation" with Ramin Baghai and Krishnamurthy Subramanian.
- "Labor Laws and Innovation" with Ramin Baghai and Krishnamurthy Subramanian.
- "Fire-sale FDI" with Hyun-Song Shin and Tanju Yorulmazer.

Working papers
- "Caught Between Scylla and Charybdis? Regulating Bank Leverage When There is Rent-Seeking and Risk-Shifting" with Hamid Mehran and Anjan Thakor.
- "Measuring Systemic Risk" with Lasse Pedersen, Thomas Philippon and Matthew Richardson.
- "Centralized versus Over-the-counter Markets" with Alberto Bisin.
- "The Seeds of a Crisis: A Theory of Bank Liquidity and Risk Taking over the Business Cycle" with Hassan Naqvi.
- "Competition for Managers, Corporate Governance and Incentive Compensation" with Marc Gabarro and Paolo Volpin.
- "Aggregate Risk and the Choice between Cash and Lines of Credit" with Heitor Almeida and Murillo Campello.
- "Precautionary Hoarding of Liquidity and Inter-Bank Markets: Evidence from the Sub-prime Crisis" with Ouarda Merrouche.
- "Liquidity Risk and Correlation Risk: A Clinical Study of the General Motors and Ford Downgrade of 2005" with Stephen Schaefer and Yili Zhang
- "Cash Holdings and Credit Risk" with Sergei Davydenko and Ilya Strebulaev.

Work in progress
- "Liquidity Risk of Corporate Bond Returns" with Yakov Amihud and Sreedhar Bharath.
- "Seeking Alpha: Excess Risk Taking and Competition for Managerial Talent" with Marco Pagano and Paolo Volpin.
- "The Dark Side of Liquidity Creation: Leverage and Systemic Risk" with Anjan Thakor.
- "Anatomy of Trading and Liquidity in the Credit Default Swaps Market" with Rob Engle.
- "Counterparty Risk in the Credit Default Swaps Market" with Rob Engle.
- "Innovation, Risk-sharing and Financial Fragility" with Rangarajan K. Sundaram.
- "Reciprocity in a Model of Informal Finance" with Raghuram Rajan.
- "Dividend Externalities in the Presence of Leverage" with Hanh Le and Hyun Song Shin.

Books, Monographs and Short Articles on the Crisis of 2007-09
- *"Manufacturing Tail Risk: A Perspective on the Financial Crisis of 2007-09"* with Thomas Cooley, Matthew Richardson and Ingo Walter, *Foundations and Trends® in Finance*, Vol. 4: No. 4, 247-325 (2010).
- *"Rewriting Financial Regulation: Evaluating the Congressional Proposals", e-book published on www.voxeu.org, December 2009,* an assessment from NYU Stern of HR 4173 bill, the Wall Street Reform and Consumer Protection Act of 2009, passed by the U S. House of Representatives and the U.S. Senate's Restoring American Financial Stability Act.

- *"Restoring Financial Stability: How to Repair a Failed System" – An Independent View from New York University Stern School of Business, Viral V. Acharya and Matthew Richardson, editors, (c) John Wiley & Sons, March 2009* Some of my articles featured in the book:
    - "Prologue: A Bird's Eye View – The Financial Crisis of 2007-09: Causes and Remedies", with Thomas Philippon, Matthew Richardson and Nouriel Roubini.
    - "How Banks Played the Leverage *Game*" with Philipp Schnabl.
    - "Centralized Clearing for Credit Derivatives" with Robert Engle, Stephen Figlewski, Anthony Lynch and Marti Subrahmanyam.
    - "Regulating Systemic Risk" with Lasse Pedersen, Thomas Philippon and Matthew Richardson.
    - "Private Lessons for Public Banking: The Case for Conditionality in LOLR Facilities" with David Backus.
    - "The Financial Sector *Bailout*: Sowing the Seeds of the Next Crisis?" with Raghu Sundaram.
- *"The Financial Crisis of 2007-09: Causes and Remedies", Viral V Acharya and Matthew Richardson, editors, New York University Salomon Center Series on Financial Markets, Institutions and Instruments, (c) Blackwell, March 2009*
    - Overview and Executive Summaries of articles in the book *"Restoring Financial Stability: How to Repair a Failed System"*
- "State of Corporate Finance: It's Not Over Yet" with Matthew Richardson, 2009, *Financial Executive*, September 2009, 38-42
- "Government Guarantees. Why We Need to Put the Genie Back in the Bottle" with Matthew Richardson, *The Economists' Voice*, October 2009.
- "Market Failures and Regulatory Failures: Lessons from Past and Present Crises" with Thomas Cooley, Matthew Richardson and Ingo Walter, *forthcoming in "Financial Sector Regulation and Reforms in Emerging Markets"* edited by Masahiro Kawai and Eswar Prasad, Brookings Institution Press (Washington, DC), 2010.
- "A Tax on Systemic Risk" with Lasse Pedersen, Thomas Philippon and Matthew Richardson, 2010, *forthcoming, NBER publication on Quantifying Systemic Risk*, ed. By Joseph Haubrich and Andrew Lo.
- "Dividends and Bank Capital in the Financial Crisis of 2007-09" with Irvind Gujral and Hyun-Song Shin, *forthcoming, Journal of Applied Corporate Finance*
- "Capital Budgeting at Banks: The Role of Government Guarantees", with Julian Franks, prepared for Knight Vinke Asset Management, published in various versions in *The Banker (February 2009), QFinance, voxeu org, Agenda - Advancing Economics in Business, London Business School's Business Strategy Review and Alumni magazine.*
- "What If a Large, Complex Financial Institution Fails?" with Matthew Richardson and Nouriel Roubini, June 2009, mimeo.
- "On the Financial Regulation of Insurance Companies" with John Biggs, Matthew Richardson and Stephen Ryan, September 2009, mimeo.

Invited Articles, Overviews and Presentations

- "Measuring and Taxing Systemic Risk", Keynote Presentation at the Fields Institute in Toronto, May 2010; Keynote Presentation at the Korea Development Institute in Seoul, May 2010.
- "How Banks Play the Leverage Game and What To Do About It", Congressional Hearing to the Financial Services Oversight and Investigations Subcommittee, May 2010.
- "Board of Directors and Experience: A Lesson from Private Equity" (with Conor Kehoe), *McKinsey on Finance*, Number 35, Spring 2010, pp 18-19.
- "Roundtable on a Financial Levy", Panelist at the Korea Economic Institute and the Ministry of Strategy and Finance, April 2010.
- "The Future of Financial Reforms", Keynote speech at the 2010 MARC conference at Villanova University, March 2010; Panelist at the Federal Reserve Bank of Chicago Conference on Bank Structure and Competition, May 2010.
- "Systemic Risk, Stronger Regulation and Liquidity Management: Changes for Which Risk Management Should Be Prepared", Webinar, PRMIA, February 2010.
- "Dynamics of Aggregate Liquidity Shocks", presentation at the BCBS-CFGS roundtable on Systemic Liquidity Risk, organized by the New York Federal Reserve and Bank for International Settlements, November 2009; Banque de France, December 2009

- "Causes of the Financial Crisis", presentation at a conference at Yale University on the *Future of Globalization,* November 2009.
- "Too big to fail, too big to manage, or just too big?" Central Banking Seminar at the New York Federal Reserve, October 2009; Daiwa Securities Research conference, Tokyo, October 2009.
- "Fixing the OTC Market: Centralized Counterparty and Transparency", European Commission Conference, September 2009, NYU-Stern Derivatives Research Retreat, November 2009.
- "Regulation of Derivatives in India: Too Much or Too Little?", NIPFP (Delhi), September 2009.
- "Regulating Systemic Risk", Presentations at the Federal Reserve Bank of New York and Federal Reserve Bank of Cleveland, March-August 2009.
- "Dividends and Bank Capital in the Financial Crisis of 2007-2009", Presentation to Liquidity Working Group of the Federal Reserve Bank of New York, April 2009.
- "Restoring Financial Stability: How to Repair a Failed System", Presentations in 2009 at Baruch College, NYU-Stern, Bank of England, Banque de France, International Monetary Fund, Growth Commission Workshop at Harvard, World Bank, Journal of Financial Intermediation Conference on the Financial Crisis in Barcelona, the CFA Society of the UK, Bank of Finland, Helsinki School of Economics, Bank for International Settlements, London School of Economics, Indian School of Business, Bombay (Mumbai) Stock Exchange, ICRIER (Delhi), Bank of Canada, Moody's KMV, Nykredit Symposium in Copenhagen, Universitat van Amsterdam Center for Corporate Governance, Swiss Finance Institute Meeting 2009, NYU-Law Conference on Rethinking the Taxation of the Financial Sector.
- "Credit Derivatives: Some Puzzling Facts", BNP Paribas Center, HEC Paris, March 2009.
- "The Voice of Experience: Public versus Private Equity", with Conor Kehoe and Michael Reyner, in *The McKinsey Quarterly*, Spring 2009.
- "Corporate Governance and Value Creation: Evidence from Private Equity", Presentation to the HM Treasury Group and Regulators for Pensions and Financial Reporting, November 2007, November 2008.
- "Private Equity and Hedge Funds: The Changing Face of Corporate Governance", Presentation to the HM Treasury Group and London Business School Governance Center, October 2006, to Freshfields Private Equity Group, December 2006.
- "Liquidity, Liquidity Risk and Credit Spreads: Some Open Questions," for The Third Annual Credit Risk Conference organized by Moody's and Stern School of Business, New York University, May 16-17, 2006.
- "Understanding and Managing Correlation Risk and Liquidity Risk," with Stephen Schaefer, *International Financial Risk Institute (IFRI) Roundtable,* 29-30 Sep 2005, *CREDIT Conference in Venice*, Sep 2006, *RISK Magazine's Credit Risk Summit (Europe),* 2-3 Oct 2006.
- "Should Banks Be Diversified? Evidence from Individual Bank Loan Portfolios," *Proceedings of the Federal Reserve Bank of Chicago Conference on Bank Structure and Competition*, 2002, with Anthony Saunders and Iftekhar Hasan.
- "Competition amongst Banks, Capital Requirements, and International Spillovers," *Economic Notes,* 30(3), 2001, 337-358.

Teaching

- Credit Risk: Executive Education (S&P), NYU-Stern's AIF program, Integrated Risk Mgt
  Spring 2010, 2009 – Teaching rating: 6.0/7.0 (S&P), 4.3/5.0 (AIF), 5.73/7.0 (Risk Mgt)
- Credit Risk, Full-time MBA and Langone (Part-time MBA) elective, NYU Stern.
  Spring 2010, 2009 – Teaching rating: 6.0/7.0
- Credit Risk, MBA/Masters in Finance Elective, LBS (with Stephen Schaefer).
  Summer 2008 – Teaching rating: 4.66/5.00, Summer 2007 – Teaching rating: 4.39/5.00
- Corporate Finance and Valuation, Masters in Finance Core, LBS.
  Fall 2006, 2005, 2004, 2003, 2002, Average teaching rating: 4.20/5.00
  Summer 2004 [Indian School of Business], Teaching rating: 6.28/7.00
- Options and Futures, MBA/Masters in Finance Elective, LBS.
  Fall 2006, 2005, 2004, Spring 2004, 2003, 2002, Average teaching rating: 4.13/5.00
  Fall 2003 [Indian School of Business], Teaching rating: 6.65/7.00

Teaching Awards

- Runner-up for Best Teacher in Masters in Finance at London Business School, 2006-07

Grants

- BNP Paribas Hedge Fund Center, 2009; Q-group, 2009; Europlace de Finance, 2008; BSI Gamma Foundation, 2008; Global Association of Risk Professionals (GARP), 2008; Senior Houblon Norman Fellowship at the Bank of England, July-August 2008; INQUIRE Europe, 2007-08; Leverhulme Trust Fellowship, 2007-08; Fondation Banque de France, 2008, 2005, 2004; Research & Materials Development, London Business School, 2008, 2007, 2006, 2005, 2003, 2001; INQUIRE, UK, 2002.

Editorship

- Editor – Journal of Financial Intermediation (2009-)
- Associate Editor – Management Science (2009-), Review of Finance (2006-), Review of Financial Studies (2005-2008), Journal of Financial Intermediation (2005-2008), International Journal of Central Banking (2004-2006), Journal of Financial Stability (2004-), Journal of Financial Services Research (2007-)

Refereeing

- Econometrica, American Economic Review, Journal of Political Economy, Review of Economic Studies, Quarterly Journal of Economics, Rand Journal of Economics, Journal of Economic Theory, International Economic Review, Journal of Law, Economics and Organization, Journal of Finance, Journal of Financial Economics, Review of Financial Studies, Management Science, Journal of Financial and Quantitative Analysis, Journal of Banking and Finance, Journal of Financial Intermediation, Review of Finance, Journal of Money, Credit and Banking, International Journal of Central Banking, Journal of Financial Stability, Journal of International Economics, The B.E. Journals in Theoretical Economics, Review of Derivatives Research, Mathematical Finance, Journal of Derivatives, Journal of Financial Services Research, Bank of England Working Papers, Economic Theory, European Economic Review, Journal of the European Economic Association, Economic Notes.
- Expert Panelist for European Research Council (ERC)'s Advanced Grant Evaluation, 2010, 2008, 2009 (remote); Reviews of NSF, ESRC and Candian Research Council Grant Proposals.
- Jury member for Jaime Fernandez de Araoz Corporate Finance Award, 2010.
- Book review of "Credit Risk – Pricing, Measurement, and Management" by Darrell Duffie and Kenneth J. Singleton, for Economica, 2004.
- Co-organizer of the Second Theory Workshop on Corporate Finance and Financial Markets at NYU-Stern, May 2010.
- Scientific Committee –Annual Credit Risk Conference organized by Moody's and London Business School, 2010 (co-chair), 2008, 2005, CREDIT Conference (Venice), 2009, 2008, 2006.
- Program Committee – AFA, 2011, 2008, WFA, 2006-2010, EFA, 2002-2009, 2010 (Track Chair. Financial Crises and Regulation), Financial Intermediation Research Society – 2004-2010, Corporate Finance of Financial Intermediaries (Wharton) – 2006, FMA – 2010, 2008, Indian School of Business Summer Conference, 2007-10, UniCredit Conference on Risk Transfer, 2009, JFI/BIS conferences on financial intermediation, 2008-10, Private Equity conferences at ESSEC, 2008-09, Emerging Markets Conference in Beijing, 2010, Entrepreneurial Finance and Innovation Conference, 2010, CEPR-EIEF Workshop on Disclosure and Market Discipline, 2010, International Risk Management Conference, 2010, NYU Salomon Center and NY Fed Conference on Financial Intermediation, 2010, Washington University Corporate Finance Conference, 2010.

Discussions

- NBER Conference on Risk of Financial Institutions – June 2010, Economics of Payments IV conference at the Federal Reserve Bank of New York – 2010, Carnegie-Rochester Public Policy Conference, April 2009; Econometric Society – 2010, 2009, 2006, AEA – 2010, 2009, AFA – 2010, 2009, 2008, 2007, 2003, WFA – 2009, 2008, 2005, 1999-2002, EFA – 1999-2003; NBER Summer Institute for Corporate Finance, 2008, 2006, 2002; NBER Corporate Finance – 2002; NYU-Penn Conference on "Law and Finance", February 2006; Liquidity Conference at Federal Reserve Bank of New York, October 2005; Financial Intermediation Research Society Meetings – May 2004, Capri; Conference on "Liquidity Concepts and Financial Instabilities," June 2003, Eltville.

Presentations (2009-)

- Sixth Annual Credit Risk Conference organized by Moody's and NYU-Stern, Conference on Contingent Capital at the Federal Reserve Bank of New York, Maryland Macro/Finance workshop, NBER Corporate Finance, NBER Securitization, Volatility and Systemic Risk conference of the Society of Financial Econometrics (SoFiE), Federal Reserve Bank of New York, International Research Forum on Monetary Policy at the Board of Governors, Federal Reserve Board of Governors, NBER Law and Economics, NYU-Stern, Kansas City Fed, De Paul University, Cleveland Fed, AFA (2010), AEA (2010), ES (2010), Europlace de Finance conference (Paris), UniCredit conference (Rome), UNC, UCLA, USC, European Central Bank, Swiss Finance Institute, Theory workshop at MIT, NY Fed and BIS conference on Systemic Liquidity Risk, Philadelphia Fed, NBER Asset Pricing, Globalization conference at Yale, Derivatives Research Retreat at NYU-Stern, Universitat van Amsterdam, Goethe University, Nykredit Symposium of Copenhagen Business School, Daiwa Institute of Research, Moody's KMV, McGill, Bank of Canada, U. Waterloo, Wharton, European Commission Derivatives Conference, NIPFP (India), ICRIER (India), UIUC, Washington University at St Louis, Federal Reserve Bank of Minneapolis conference at the New York Fed, Bombay (Mumbai) Stock Exchange, Indian School of Business, Federal Reserve Bank of Cleveland, Organizer and presenter at the "Short-term Debt and Asset Prices" session at Gerzensee (2009), NBER Market Institutions and Financial Market Risk, London School of Economics, Western Finance Association Meetings 2009, Bank for International Settlements (Basel), Bank of Finland, Helsinki School of Economics, Euronext Conference in Amsterdam, CFA Society of the UK, University of Binghamton, Tuck Business School, JFI Conference on the Financial Crisis, World Bank, Growth Commission Workshop, International Monetary Fund, Bank of England, Banque de France, Federal Reserve Bank of Philadelphia, NYU-Economics, Baruch College, NYU Law and Finance Symposium, Federal Reserve Bank of New York Conference on Liquidity.

Press Coverage

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- Institute for Financial Management and Research/Academy for Management Excellence (IFMR/ACME), India - Design of Post-Graduate Program in Quantitative Finance, 2003-4.
- J. P. Morgan Equity Derivatives Research, New York, Summer 1997 - Developed a Monte Carlo valuation of complex derivative products, based on quasi-random sequences and Brownian Bridge technique, documented in technical mimeo "Hybrid Quasi-Monte Carlo Methods for Valuation," with Julia Chislenko, Jonathan Goodman and Arnon Levy.

Hobbies

- Singing and composing (Indian semi-classical), Poetry, Cricket, Running, Traveling.
- Founding Member and Chairman (2003-2007) of PrathamUK, the UK chapter of Pratham, an Indian NGO providing pre-primary and primary education to underprivileged children in India (www.pratham.org). Chapters raised over £2mln; Founding Member and President of PrathamUSA, the NY/NJ chapter of Pratham, 1998-2001.
- Boardmember, GIVE (Giving Impetus to Voluntary Effort) – UK, 2003-2008.

Non-academic Awards

- Asian Achievers' Award for Community Service, 2006, awarded by Asian Voice and Gujarat Samachar in UK
- Short-listed in the final seven for the "Young Philanthropist" Award of Beacon Fellowships in the UK, 2004-05, 2005-06.

References

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Testimony

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FINANCIAL MARKETS REGULATION

Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System

Statement of Orice Williams Brown, Director
Financial Markets and Community Investment

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Highlights

Highlights of GAO-10-555T, a report to Subcommittee on Oversight and Investigations, House Committee on Financial Services

May 2010

FINANCIAL MARKETS REGULATION

Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System

Why GAO Did This Study

In 2009 GAO conducted a study on the role of leverage in the recent financial crisis and federal oversight of leverage, as mandated by the Emergency Economic Stabilization Act. This testimony presents the results of that study, and discusses (1) how leveraging and deleveraging by financial institutions may have contributed to the crisis, (2) how federal financial regulators limit the buildup of leverage, and (3) the limitations the crisis has revealed in regulatory approaches used to restrict leverage and regulatory proposals to address them.

To meet these objectives, GAO built on its existing body of work, reviewed relevant laws and regulations and academic and other studies, and interviewed regulators and market participants.

What GAO Recommends

As Congress considers establishing a systemic risk regulator, it should consider the merits of assigning such a regulator with responsibility for overseeing systemwide leverage. As U S. regulators continue to consider reforms to strengthen oversight of leverage, we recommend that they assess the extent to which reforms under Basel II, a new risk-based capital framework, will address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches used for capital adequacy purposes In their written comments, the regulators generally agreed with GAO's conclusions and recommendation

View GAO-10-555T or key components
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What GAO Found

Some studies suggested that leverage steadily increased in the financial sector before the crisis began in mid-2007 and created vulnerabilities that have increased the severity of the crisis. In addition, subsequent disorderly deleveraging by financial institutions may have compounded the crisis. First, the studies suggested that the efforts taken by financial institutions to deleverage by selling financial assets could cause prices to spiral downward during times of market stress and exacerbate a financial crisis. Second, the studies suggested that deleveraging by restricting new lending could slow economic growth. However, other theories also provide possible explanations for the sharp price declines observed in certain assets. As the crisis is complex, no single theory is likely to fully explain what occurred or rule out other explanations. Regulators and market participants we interviewed had mixed views about the effects of deleveraging. Some officials told us that they generally have not seen asset sales leading to downward price spirals, but others said that asset sales have led to such spirals.

Federal regulators impose capital and other requirements on their regulated institutions to limit leverage and ensure financial stability. Federal bank regulators impose minimum risk-based capital and leverage ratios on banks and thrifts and supervise the capital adequacy of such firms through on-site examinations and off-site monitoring. Bank holding companies are subject to similar capital requirements as banks, but capital levels of thrift holding companies are individually evaluated based on each company's risk profile. The Securities and Exchange Commission uses its net capital rule to limit broker-dealer leverage and used to require certain broker-dealer holding companies to report risk-based capital ratios and meet certain liquidity requirements. Other important market participants, such as hedge funds, also use leverage. Hedge funds typically are not subject to regulatory capital requirements, but market discipline, supplemented by regulatory oversight of institutions that transact with them, can serve to constrain their leverage.

The crisis has revealed limitations in regulatory approaches used to restrict leverage. First, regulatory capital measures did not always fully capture certain risks, which resulted in some institutions not holding capital commensurate with their risks and facing capital shortfalls when the crisis began. Federal regulators have called for reforms, including through international efforts to revise the Basel II capital framework. The planned U.S. implementation of Basel II would increase reliance on risk models for determining capital needs for certain large institutions. The crisis underscored concerns about the use of such models for determining capital adequacy, but regulators have not assessed whether proposed Basel II reforms will address these concerns. Such an assessment is critical to ensure that changes to the regulatory framework address the limitations the crisis had revealed. Second, regulators face challenges in counteracting cyclical leverage trends and are working on reform proposals. Finally, the crisis has revealed that with multiple regulators responsible for individual markets or institutions, none has clear responsibility to assess the potential effects of the buildup of systemwide leverage or the collective effect of institutions' deleveraging activities.

Chairman Moore, Ranking Member Biggert, and Members of the Subcommittee:

I appreciate the opportunity to participate in today's hearing to discuss debt and leverage in financial markets in the context of the recent financial crisis. As you know, the buildup of leverage during a market expansion and the rush to reduce leverage, or "deleverage," when market conditions deteriorated was common to the recent and prior financial crises. Leverage traditionally has referred to the use of debt, instead of equity, to fund an asset and has been measured by the ratio of total assets to equity on the balance sheet. But as witnessed in the recent crisis, leverage also can be used to increase an exposure to a financial asset without using debt, such as by using derivatives.[1] In that regard, leverage can be defined broadly as the ratio between some measure of risk exposure and capital that can be used to absorb unexpected losses from the exposure.[2] However, because leverage can be achieved through many different strategies, no single measure can capture all aspects of leverage. Federal financial regulators are responsible for establishing regulations that restrict the use of leverage by financial institutions under their authority and supervising their institutions' compliance with such regulations.

My statement today is based on our July 2009 report on the role of leverage and deleveraging by financial institutions in the recent crisis and federal oversight of leverage.[3] We completed this work in response to a mandate contained in section 117 of the Emergency Economic Stabilization Act of 2008.[4] Specifically, I will discuss (1) how leveraging and deleveraging by financial institutions may have contributed to the crisis; (2) how federal financial regulators limit the buildup of leverage; and (3) the limitations the crisis has revealed in regulatory approaches to restrict leverage and regulatory proposals to address them.

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[1] Derivatives are financial products whose value is determined from an underlying reference rate (interest rates, foreign currency exchange rates); an index (that reflects the collective value of various financial products); or an asset (stocks, bonds, and commodities). Derivatives can be traded through central locations, called exchanges, where buyers and sellers, or their representatives, meet to determine prices; or privately negotiated by the parties off the exchanges or over the counter (OTC).

[2] Capital generally is defined as a firm's long-term source of funding, contributed largely by a firm's equity stockholders and its own returns in the form of retained earnings. One important function of capital is to absorb losses.

[3] GAO, *Financial Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System*, GAO-09-739 (Washington, D.C.: July 22, 2009)

[4] 12 U.S.C § 5227.

To address our objectives, we reviewed and analyzed (1) academic and other studies assessing the buildup of leverage prior to the recent financial crisis and the economic mechanisms that possibly helped the mortgage-related losses spread to other markets and expand into the recent crisis; (2) relevant laws and regulations, and other regulatory guidance and materials, related to the oversight of financial institutions' use of leverage by the Federal Reserve, Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), Office of Thrift Supervision (OTS), and Securities and Exchange Commission (SEC); and (3) various data to illustrate leverage and other relevant trends. We assessed the reliability of the data and found that they were sufficiently reliable for our purposes. We also reviewed and analyzed studies done by U.S. and international regulators and others identifying limitations in the regulatory framework used to restrict leverage and proposals to address such limitations. Finally, we reviewed prior GAO work on the financial regulatory system. In addition, we interviewed staff from these federal financial regulators and officials from two securities firms, a bank, and a credit rating agency.

We conducted our work between February and July 2009 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Summary

The causes of the recent financial crisis remain subject to debate and additional research. Nevertheless, some researchers and regulators have suggested that the buildup of leverage before the financial crisis and subsequent disorderly deleveraging have compounded the recent financial crisis. In particular, some studies suggested that the efforts taken by financial institutions to deleverage by selling financial assets could lead to a downward price spiral in times of market stress and exacerbate a financial crisis. However, alternative theories provide possible explanations; for example, the drop in asset prices may reflect prices reverting to more reasonable levels after a period of overvaluation or it may reflect uncertainty surrounding the true value of the assets. In addition, deleveraging by restricting new lending could slow economic growth and thereby contribute to a financial crisis.

Federal financial regulators impose capital and other requirements such as leverage measures on their regulated institutions to limit leverage and ensure financial stability. Federal banking regulators impose minimum risk-based capital and leverage ratios on banks and thrifts and supervise the capital adequacy of such firms through on-site examinations and off-site monitoring. Bank holding companies are subject to similar capital requirements as banks, but thrift holding companies are not. Capital levels of thrift holding companies are individually evaluated based on each company's risk profile. SEC uses its net capital rule to limit broker-dealer leverage. Other important market participants, such as hedge funds, also use leverage. Hedge funds typically are not subject to regulatory capital requirements, but market discipline, supplemented by regulatory oversight of institutions that transact with them, can serve to constrain their leverage.

The crisis has revealed limitations in the financial regulatory capital framework's ability to restrict leverage and to mitigate crisis. First, regulatory capital measures did not always fully capture certain risks. As a result, these institutions did not hold capital commensurate with their risks and some faced capital shortfalls when the crisis began. Federal regulators have called for reforms, including international efforts to revise the Basel II capital framework. The planned U.S. implementation of Basel II would increase reliance on risk models for determining capital needs for certain large institutions. The crisis underscored concerns about the use of such models for determining capital adequacy, but regulators have not assessed whether proposed Basel II reforms will address these concerns. Such an assessment is critical to help ensure that changes to the regulatory framework address the limitations revealed by the recent crisis. Second, regulators face challenges in counteracting cyclical leverage trends. Finally, with multiple regulators responsible for individual markets or institutions, none has clear responsibility to assess the potential effects of the buildup of systemwide leverage or the collective effects of institutions' deleveraging activities.

Background

Many financial institutions use leverage to expand their ability to invest or trade in financial assets and to increase their return on equity. A firm can use leverage through a number of strategies, including by using debt to finance an asset or entering into derivatives. Greater financial leverage, as measured by lower proportions of capital relative to assets, can increase the firm's market risk, because leverage magnifies gains and losses relative to equity. Leverage also can increase a firm's liquidity risk, because a leveraged firm may be forced to sell assets under adverse market conditions to reduce its exposure. Although commonly used as a leverage measure, the ratio of assets to equity captures only on-balance sheet assets and treats all assets as equally risky. Moreover, the ratio of assets to equity helps to measure the extent to which a change in total assets would affect equity but provides no information on the probability of such a change occurring. Finally, a leveraged position may not be more risky than a non-leveraged position, when other aspects of the position are not equal. For example, a non-leveraged position in a highly risky asset could be more risky than a leveraged position in a low risk asset.

During the 1980s, banking regulators became concerned that simple leverage measures—such as the ratio of assets to equity or debt to equity—required too much capital for less-risky assets and not enough for riskier assets and that such measures did not require capital for growing portfolios of off-balance sheet items. In response to these concerns, the Basel Committee on Banking Supervision adopted Basel I, an international framework for risk-based capital that required banks to meet minimum risk-based capital ratios, in 1988.[5] By 1992, U.S. regulators had fully implemented Basel I; and in 1996, they and supervisors from other Basel Committee member countries amended the framework to include explicit capital requirements for market risk from trading activity (called the Market Risk Amendment).[6] In response to the views of bankers and many regulators that innovation in financial markets and advances in risk management have revealed limitations in the existing Basel I risk-based capital framework, especially for large, complex banks, the Basel Committee released the Basel II international accord in 2004.[7] Since then, individual countries have been implementing national rules based on the principles and detailed framework. In a prior report, we discussed the status of efforts by U.S. regulators to implement the Basel II accord.[8]

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[5] The Basel Committee on Banking Supervision (Basel Committee) seeks to improve the quality of banking supervision worldwide, in part by developing broad supervisory standards. The Basel Committee consists of central bank and regulatory officials from Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. The Basel Committee's supervisory standards are also often adopted by nonmember countries.

[6] According to Office of Thrift Supervision (OTS) staff, OTS did not adopt the capital requirements for trading book market risk.

[7] For more information about the limitations of Basel I and the three pillars of Basel II, see GAO-09-739.

Research Suggests Leverage Increased before the Crisis and Subsequent Deleveraging Could Have Contributed to the Crisis

Studies we reviewed suggest that leverage within the financial sector increased before the crisis and that subsequent deleveraging by financial institutions could have contributed to the recent crisis. The causes of the recent financial crisis are complex and multifaceted and remain subject to debate and ongoing research. Given our mandate, our review of the economic literature focused narrowly on deleveraging as one of the potential economic mechanisms contributing to the crisis. The studies we reviewed do not provide definitive findings about the role of deleveraging relative to other mechanisms, and we relied on our interpretation and reasoning to develop insights from the studies we reviewed.

Leverage within the Financial Sector Increased before the Financial Crisis, and Financial Institutions Sought to Deleverage When the Crisis Began

Leverage steadily increased in the financial sector before the crisis began around mid-2007 and created vulnerabilities that increased the severity of the crisis, according to studies we reviewed.[9] As mentioned earlier, leverage can take many different forms, and no single measure of leverage exists. In that regard, the studies we reviewed generally identified a range of sources that aided in the buildup of leverage before the crisis. One such source was the reliance on short-term funding by financial institutions, which made them vulnerable to a decline in the availability of such credit. Another source of leverage was special purpose entities (SPE), which some banks created to buy and hold mortgage-related and other assets that the banks did not want to hold on their balance sheets. SPEs often borrowed by issuing shorter-term instruments, exposing them to the risk of not being able to renew their debt. Other sources of leverage included collateralized debt obligations (CDOs) and credit default swaps, a type of OTC derivative.[10] For securities firms, hedge funds, and other financial intermediaries that operate mainly through the capital markets, their balance sheet leverage, or ratio of total assets to equity, tends to be procyclical.[11] Historically, such institutions tended to increase their leverage when asset prices rose and decrease their leverage when asset prices fell. Consistent with this trend, the ratio of assets to equity for five large broker-dealer holding companies, in aggregate, increased from an average ratio of around 22 to 1 in 2002 to around 30 to 1 in 2007 (see fig. 1).

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[8] GAO, *Risk-Based Capital: New Basel II Rules Reduced Certain Competitive Concerns, but Bank Regulators Should Address Remaining Uncertainties*, GAO-08-953 (Washington, D.C.: Sept. 12, 2008).

[9] See, for example, Financial Services Authority, The Turner Review: A Regulatory Response to the Global Banking Crisis (London: March 2009); Willem H. Buiter, "Lessons from the North Atlantic Financial Crisis," paper prepared for presentation at the conference "The Role of Money Markets," jointly organized by Columbia Business School and the Federal Reserve Bank of New York on May 29-30, 2008 (May 2008); Martin Neil Baily, Robert E. Litan, and Matthew S. Johnson, "The Origins of the Financial Crisis," Fixing Finance Series-Paper 3, (Washington, D.C.: The Brookings Institution, November 2008); and Ben Cohen and Eli Remolona, "The Unfolding Turmoil of 2007–2008. Lessons and Responses," Proceedings of a Conference, Sydney, Australia, Reserve Bank of Australia, Sydney.

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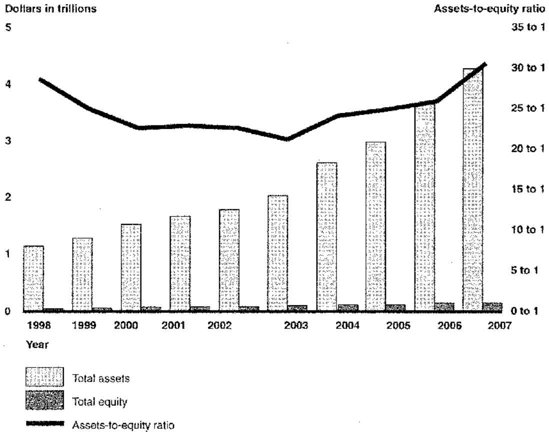
[10] In a basic collateralized-debt obligation (CDO), a group of debt securities are pooled, and securities are then issued in different tranches (or slices) that vary in risk and return. Through pooling and slicing, CDOs can give investors an embedded leveraged exposure. For a discussion of embedded leverage in CDOs, see The Joint Forum, Credit Risk Transfer, Basel Committee on Banking Supervision (Basel, Switzerland: October 2004).

[11] We use the term "securities firms" generally to refer to the holding companies of broker-dealers.

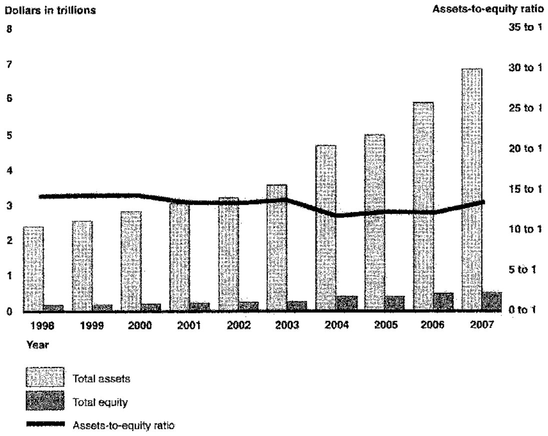
Figure 1: Total Assets, Total Equity, and Leverage (Asset-to-Equity) Ratio in Aggregate for Five Large U.S. Broker-Dealer Holding Companies, 1998 to 2007



Source: GAO analysis of annual report data for Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley.

In contrast, the ratio of assets to equity for five large bank holding companies, in aggregate, was relatively flat during this period (see fig. 2). As discussed in the background, the ratio of assets to equity as a measure of leverage treats all assets as equally risky and does not capture off-balance sheet risks.

Figure 2: Total Assets, Total Equity, and Assets-to-Equity Ratio in Aggregate for Five Large U.S. Bank Holding Companies, 1998 to 2007



Source: GAO analysis of annual report and Federal Reserve Y-9C data for Bank of America, Citigroup, JPMorgan Chase, Wachovia, and Wells Fargo.

As their mortgage-related and other losses grew after the onset of the crisis, banks, securities firms, hedge funds, and other financial institutions have attempted to deleverage and reduce their risk. Deleveraging can cover a range of strategies, including raising new equity, reducing dividend payouts, diversifying sources of funds, selling assets, and reducing lending. After the crisis began, U.S. banks and securities firms initially deleveraged by raising more than $200 billion in new capital from private sources and sovereign wealth funds.[12] However, raising capital began to be increasingly difficult in the subsequent period, and financial institutions have deleveraged by selling assets, including financial instruments and noncore businesses. For example, in the fourth quarter of 2008, broker-dealers reduced assets by nearly $785 billion and banks reduced bank credit by nearly $84 billion.

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[12] Sovereign wealth funds generally are pools of government funds invested in assets in other countries

Some Studies Suggested That Deleveraging by Financial Institutions by Selling Financial Assets and Restricting New Lending Could Have Contributed to the Crisis

Some studies we reviewed highlighted the possibility that deleveraging through asset sales by financial institutions could trigger downward spirals in asset prices and contribute to a financial crisis.[13] In times of market stress, a sharp decline in an asset's price can become self-sustaining and lead to a financial market crisis. Following a sharp decline in an asset's price, investors normally will buy the asset after they deem its price has dropped enough and help stabilize the market, but in times of crisis, investors are unable or unwilling to buy the asset. As the asset's price declines, more investors sell and push the price lower. For leveraged institutions holding the asset, the impact of their losses on capital will be magnified. To lower their leverage or risk, the institutions may sell more of their assets, which can cause the asset's price to drop even more and induce another round of selling. In other words, when market liquidity is low, namely in times of market stress, asset sales establish lower market prices and result in financial institutions marking down their positions—potentially creating a reinforcing cycle of deleveraging. In the extreme, this downward asset spiral could cause the asset's price to be set below its fundamental value, or at a "fire sale" price. In addition, a decline in a financial asset's price could trigger sales when the asset is used as collateral for a loan. In such a case, the borrower could be required to post additional collateral for its loan, but if the borrower could not do so, the lender could take ownership of the collateral and then sell it, which could cause the asset's price to decline further.

Importantly, other theories that do not involve asset spirals caused by deleveraging through asset sales provide possible explanations for the sharp price declines in mortgage-related securities and other financial instruments. Moreover, as the crisis is complex, no single theory likely is to explain in full what occurred or necessarily rule out other explanations. First, given the default characteristics of the mortgages underlying their related securities and falling housing prices, low market prices may result from asset prices reverting to more reasonable values after a period of overvaluation. Second, the low prices of mortgage-related securities and other financial instruments may have resulted from the uncertainty surrounding their true value. This theory holds that investors may lack the information needed to distinguish between the good and bad securities and, as a result, discount the prices of the good securities.[14] These two theories and the deleveraging hypothesis may provide some insight into how the financial crisis has unfolded and are not mutually exclusive. Nonetheless, at this juncture, it is difficult to determine whether a return to fundamentals, uncertainty, or forced asset sales played a larger causal role.

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[13] See, for example, Markus K. Brunnermeier, "Deciphering the 2007-08 Liquidity and Credit Crunch," Journal of Economic Perspectives 23, no. 1 (2009), pp. 77-100; Greenlaw et al. (2008); and Anil K., Kashyap, Raghuram G. Rajan, and Jeremy C. Stein, "Rethinking Capital Regulation," paper prepared for Federal Reserve Bank of Kansas City symposium on "Maintaining Stability in a Changing Financial System," Jackson Hole, Wyoming, August 21-23, 2008 (September 2008)

In addition, some studies we reviewed suggested that deleveraging by restricting new lending could contribute to the crisis by slowing economic growth. In short, the concern is that banks, because of their leverage, will need to cut back their lending by a multiple of their credit losses to restore their balance sheets or capital-to-asset ratios. The contraction in bank lending can lead to a decline in consumption and investment spending, which reduces business and household incomes and negatively affects the real economy. Moreover, rapidly declining asset prices can inhibit the ability of borrowers to raise money in the securities markets.

Regulators and Market Participants Had Mixed Views about the Effects of Deleveraging in the Recent Crisis

Officials from federal financial regulators, two securities firms, a bank, and a credit rating agency whom we interviewed had mixed views about the effects of deleveraging by financial institutions in the recent crisis. Nearly all of the officials told us that large banks and securities firms generally have sought to reduce their risk exposures since late 2007, partly in response to liquidity pressures. The institutions have used a number of strategies to deleverage, including raising new capital; curtailing certain lines of business; and selling assets, including trading assets, loans, and noncore businesses. Regulatory officials said that hedge funds and other asset managers also deleveraged by selling assets to meet redemptions or margin calls. According to officials at a securities firm, raising capital and selling financial assets was easier in the beginning of the recent crisis, but both became harder to do as the crisis continued. Regulatory and credit rating agency officials also said that financial institutions have faced challenges in selling mortgages and other loans that they planned to securitize, because the securitization markets essentially had shut down during the crisis.

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[14] The seminal paper on this issue is Akerlof, George A., "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," Quarterly Journal of Economics, 84(3), pp. 488-500, 1970.

The regulators and market participants we interviewed had mixed views on whether sales of financial assets contributed to a downward price spiral. Officials from one bank and the Federal Reserve staff we interviewed said that due to the lack of market liquidity for some instruments and the unwillingness of many market participants to sell them, declines in prices that may be attributed to market-driven asset spirals generally resulted from the use of models to price assets in the absence of any sales. Federal Reserve staff also said that it is hard to attribute specific factors as a cause of an observed asset spiral because of the difficulty in disentangling the interacting factors that can cause financial asset prices to move down. In contrast, officials from two securities firms and a credit rating agency, and staff from SEC and OCC told us that asset spirals occurred in certain mortgage and other debt markets. Officials from one securities firm said that financial institutions, such as hedge funds, generally sought to sell first those financial assets that were hardest to finance, which eventually caused these markets to become illiquid. The absence of observable prices for such assets then caused their prices to deteriorate even more. According to the securities firm officials, firms that needed to sell assets to cover losses or meet margin calls helped to drive such asset sales.

FDIC and OCC staff and officials from a credit rating agency told us that some banks tightened their lending standards for certain types of loans, namely those with less-favorable risk-adjusted returns. Such loans include certain types of residential and commercial mortgages, leverage loans, and loans made to hedge funds. According to credit rating officials, banks essentially have set a target of slower growth for higher-risk loans that have performed poorly and deteriorated their loan portfolios. In addition, OCC and credit rating officials said that the largest banks rely heavily on their ability to securitize loans to help them make such loans. To that end, they said that the securitization markets need to open up and provide funding.

Regulators Limit Financial Institutions' Use of Leverage Primarily Through Regulatory Capital Requirements

Federal financial regulators (Federal Reserve, FDIC, OCC, and OTS) generally have imposed capital and other requirements on their regulated institutions as a way to limit excessive use of leverage and ensure the stability of the financial system and markets. Federal banking and thrift regulators have imposed minimum risk-based capital and non-risk-based leverage ratios on their regulated institutions. Risk-based capital ratios are broadly intended to require banks to hold more capital for higher-risk assets. Leverage ratios provide a cushion against risks not explicitly covered in the risk-based capital requirements, such as operational weaknesses and model risk. In addition, the regulators supervise the capital adequacy of their regulated institutions through ongoing monitoring, including on-site examinations and off-site tools. Bank holding companies are subject to capital and leverage ratio requirements similar to those for banks.[15] Thrift holding companies are not subject to such requirements; rather, capital levels of thrift holding companies are individually evaluated based on each company's risk profile. SEC primarily uses its net capital rule to limit the use of leverage by broker-dealers. According to SEC officials, firms that had participated in SEC's now defunct Consolidated Supervised Entities program calculated their risk-based capital ratios at the holding company level in a manner generally consistent with the method banks used.[16]

Other financial institutions, such as hedge funds, use leverage but, unlike banks and broker-dealers, typically are not subject to regulatory capital requirements; instead, market discipline plays a primary role in limiting leverage. Finally, the Federal Reserve regulates the use of securities as collateral to finance security purchases, but federal financial regulators told us that such credit did not play a significant role in the buildup of leverage leading to the recent crisis.

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[15] Bank holding companies are permitted to include certain debt instruments in regulatory capital that are impermissible for insured banks and, as discussed below, are not subject to statutory Prompt Corrective Action.

[16] Under its Consolidated Supervised Entities (CSE) program, the Securities and Exchange Commission (SEC) supervised broker-dealer holding companies—Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, and Morgan Stanley—on a consolidated basis. Following the sale of Bear Stearns to JPMorgan Chase, the Lehman Brothers bankruptcy filing, and the sale of Merrill Lynch to Bank of America, the remaining CSEs opted to become bank holding companies subject to Federal Reserve oversight. SEC terminated the CSE program in September 2008 but continues to oversee these firms' registered broker-dealer subsidiaries.

Regulators Are Considering Reforms to Address Limitations the Crisis Revealed in Regulatory Framework for Restricting Leverage

The financial crisis has revealed limitations in existing regulatory approaches that serve to restrict leverage. Although regulators have proposed changes to improve the risk coverage of the regulatory capital framework, limit cyclical leverage trends and better address sources of systemic risk, they have not yet fully evaluated the extent to which these proposals would address these limitations. First, regulatory capital measures did not always fully capture certain risks, particularly those associated with some mortgage-related securities held on and off balance sheets. As a result, a number of financial institutions did not hold capital commensurate with their risks and some lacked adequate capital or liquidity to withstand the market stresses of the crisis. Federal financial regulators have acknowledged the need to improve the risk coverage of the regulatory capital reform and are considering reforms to better align capital requirements with risk, but have not formally assessed the extent to which these reforms may address risk-evaluation concerns the crisis highlighted with respect to Basel II approaches. Such an assessment is critical to ensure that Basel II changes that would increase reliance on complex risk models and banks' own risk estimates do not exacerbate regulatory limitations revealed by the crisis.

Second, the recent crisis illustrated how the existing regulatory framework, along with other factors, might have contributed to cyclical leverage trends that potentially exacerbated the recent crisis. For example, according to regulators, minimum regulatory capital requirements may not provide adequate incentives for banks to build loss-absorbing capital buffers in benign markets when it would be less expensive to do so. When market conditions deteriorated, minimum capital requirements became binding for many institutions that lacked adequate buffers to absorb losses and faced sudden pressures to deleverage. Regulators are considering several options to counteract potentially harmful cyclical leverage trends, but implementation of these proposals presents challenges.

Finally, the financial crisis has illustrated the potential for financial market disruptions, not just firm failures, to be a source of systemic risk. With multiple regulators primarily responsible for individual markets or institutions, none of the financial regulators has clear responsibility to assess the potential effects of the buildup of systemwide leverage or the collective activities of the industry for the financial system. As a result, regulators may be limited in their ability to prevent or mitigate future financial crises.

To ensure that there is a systemwide approach to addressing leverage-related issues across the financial system, we have asked Congress to consider, as it moves toward the creation of a systemic risk regulator, the merits of tasking this entity with the responsibility for measuring and monitoring systemwide leverage and evaluating options to limit procyclical leverage trends. Furthermore, we made a recommendation to the financial regulators to assess the extent to which Basel II reforms may address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches used for capital purposes. In their comments on our report, the Federal Reserve, FDIC, OCC, and SEC generally agreed with our recommendations.

Mr. Chairman, Ranking Member Biggert, and Members of the Subcommittee, this completes my prepared statement. I am prepared to respond to any questions you or other Members of the Subcommittee may have at this time.

Contacts

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JOHN GEANAKOPLOS: Managing the Leverage Cycle

Thank you very much for the introduction and the invitation to speak here in Washington. I have called my talk '*Managing the leverage cycle*'. I wrote about the leverage cycle 10 years ago, before the current crisis. It is *leverage* which, I think, was at the heart of the crisis. This is my narrative, even though I realize there were other problems.

It is traditional in economics to think of the interest rate as the most important variable in the economy and to think of the interest rate as the most important policy tool to manage when you try to solve economic problems. In the United States, the Fed has a mandate to manage interest rates *and* also to manage margins and collateral, but since a few years after the Great Depression, the Fed has concentrated almost entirely on managing the interest rate. Whenever there is a problem, at least in the United States, and output is sluggish, the press and the public clamor for lower interest rates and the Fed usually delivers them. When there is too much inflation, everybody says: raise the interest rate. And that is what the Fed does. In this latest crisis the Fed has already lowered the interest rate to zero. It cannot do more on this score, and the crisis is not over. I don't think the interest rate was actually the key problem in any case. Much more important, I think, is the collateral rate or leverage. The Fed has paid more attention to collateral than any Federal Reserve since the Depression, but that does not mean it has paid enough attention.

This idea that collateral rates might be more important than interest rates is not entirely original. As you know, Shakespeare had the same thought, four hundred years ago, in the Merchant of Venice. If you remember, in that play, there was a negotiation over a loan. Shylock, the money lender, is asked for a loan by Bassanio and Antonio. Bassanio needs the money to woo the beautiful (and rich) Portia and he enlists the aid of his friend Antonio and they go to Shylock and ask for a loan. They spend five pages in the play, at least in my little copy of it, negotiating the interest rate in a fascinating discussion in which Shakespeare anticipates the modern impatience theory of interest. Shylock says: Like all my tribe, I am a patient man; Antonio says: I need the money to satisfy the ripe wants of my friend. So they are arguing about what interest rate to put in the contract, and that seems to be the main focus of the negotiation. But they also agree on the collateral. And now, which do we think Shakespeare thought was the more important? That is pretty obvious: Shakespeare thought the collateral was the more important, because nobody can remember the interest rate. Who here remembers the interest rate that Shylock charged Antonio and Bassanio? Yet, all of you, I am sure, you can all tell me what the collateral was: a pound of flesh. So Shakespeare realized the collateral was more important than the interest rate and not only that. If you remember how the play ends, the play ends with a trial and Portia disguises herself as the Judge. The Judge has to decide what to do. All of Antonio's boats have apparently sunk, and he cannot repay the 3000 ducats he owes Shylock. The Judge says that enforcing contracts is crucial to business, the lifeblood of Venice. She acknowledges that the entire contract was freely entered into by both parties. Nevertheless, she says it is for the benefit of the city that she must intervene. The Judge does not adjust the amount owed, the three thousand ducats, nor does she change the interest rate. The Judge, the Regulatory Body, just like the Federal Reserve you might say, adjusts the collateral: she says it should be a pound of flesh, but not a drop of blood! And that is my message in this talk, that the Regulatory Authority should not be changing the interest rate, it should be regulating collateral rates.

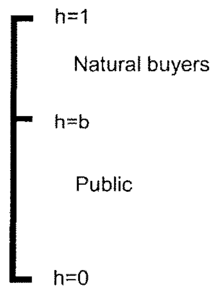
Let me start by reminding you that collateral is something like a house that you put up to guarantee a loan. If you don't pay back the money, the bank can seize your house, or whatever else you put up as collateral. Now, if you have a hundred-dollar house and you borrow eighty dollars, the lender has got a margin of safety of 20%, so we say the margin that the bank has charged you is 20%, which is also the down-payment percentage. The loan-to-value ratio is 80%, that eighty-dollar loan is eighty dollars out of a hundred-dollar collateral. The collateral rate is 125%, because a hundred-dollar house protects an eighty-dollar loan, that is 125%. Another way of saying the exact same thing is that leverage is 5: with twenty dollars of cash for a down payment you can buy a hundred-dollar asset, that is your cash gets leveraged five times, so you can buy something five-times as valuable as how much money you have. All those *ratios*, of course, mean the same thing. The difference between my work on collateral and Bernanke's is that I emphasized that collateral rates (or equivalently leverage) can change, and change quite dramatically. I am going to use the word leverage from now on, to describe the second component to the deal: there is the interest rate and then there is the collateral rate or the leverage. Once we acknowledge that leverage can change, we need to know why. What determines leverage?

In standard economic theory they have talked, since Irving Fisher, about supply and demand determining the interest rate. Irving Fisher suggested that impatience was the key driver of supply and demand for loans, and therefore the key determinant of the interest rate. Well, I want supply and demand to determine leverage as well as the interest rate. That seems paradoxical, because how can one equation, supply equals demand, determine two variables: the interest rate and the leverage? Probably because of this puzzle, economists did not study the determinants of leverage very much. If you look at any standard text book in finance or in macroeconomics, they never mention equilibrium collateral rates. They rarely even use the word leverage. My theory is about how supply and demand determine both interest and leverage. Common sense, everybody knows, practitioners know, I mean, Shakespeare understood it, interest has to do with impatience, leverage or collateral has to do with how nervous the lender is about whether he is going to be repaid. If the markets are more volatile, the lender will ask for more collateral, if the markets are less volatile, the lender is going to ask for less collateral. It is a perfectly common-sense thing and the question is just how to work the common sense into the equations of supply and demand. Unfortunately, I don't have time to talk about my equilibrium leverage theory, even though I have some slides for the end, I doubt I will ever get there, but in any case, the gist of it is that supply equals demand equations do indeed determine interest rates *and* collateral rates.

Practitioners, if not economists, have long recognized the importance of collateral and leverage. For a Wall Street trader, leverage is important for two reasons. The first is that if he is leveraged 5 times, then a 1% change in the value of the collateral means a 5% change in the value of his capital. (If the house in our example goes from $100 to $101, then after selling the house at $101 and repaying the $80 loan, the investor is left with $21 of cash on his $20 investment, a 5% return.) Leverage thus makes returns riskier, either for better or for good. Second, a borrower knows that if there is no-recourse collateral, so that he can walk away from his loan after giving up the collateral without further penalty, then his downside is limited. The most the borrower can lose on the house loan is his $20 of cash, even if the house falls in value all the way to $0 and the lender loses $80. No-recourse collateral thus gives the borrower a put option. Recently several commentators have linked leverage to the crisis, arguing that if banks were not so leveraged in their borrowing they would not have lost so much money when prices went down, and that if homeowners were not so leveraged, they would not be so far underwater now and so tempted to exercise their put option by walking away from their houses. Of course these two points are central to my own leverage cycle theory; I shall discuss them in more detail later. But there is another deeper point to my theory that has so far not received as much attention, which I think is the real story of leverage.

The main implication of my leverage cycle theory is that when leverage goes up prices go up and when leverage goes down, prices go down. Now, why should there be this asymmetry? Why does more leverage make prices go up instead of go down? Imagine the people in the economy arranged on a vertical continuum, ranked by how much they would pay for say a mortgage security asset. Some people like the asset more than others; these are the people at the top of this continuum. Most of the general public has no desire to buy any of these complicated mortgage securities; they are at the bottom of the continuum. This continuum picture stands in contrast to the usual story in financial economics, where everybody would have the same view of the "fundamental" value, if they had the same information. I don't believe in fundamental value; I think different people may have different views about the value of an asset. So the people at the top think the asset is worth more than the people at the bottom, even with the same information. Now, how many people does it take to buy the asset? Given a price, the buyers will be the people who think the asset is worth more, namely the top segment of the continuum. You can imagine the continuum divided into two segments; the top segment contains all the buyers, and the bottom segment contains all the sellers who think the asset is overpriced. The guy right on the margin between the two segments I call the marginal buyer. He is indifferent to buying or selling. In other words, the price corresponds to his valuation of the asset. Now, as leverage goes up and the people at the top are able to borrow more money, *it takes fewer of them to buy the assets*, so the marginal buyer, the cut-off between buyer and seller, will become higher. So, the price will rise: why is that? Because the marginal buyer, the person indifferent between buying and selling, he is the one setting the price and it will now be someone with a higher opinion of the value of the asset. So, when the person on the boundary between buying and selling is more optimistic, the price is going to be higher, because the price reflects his opinion, instead of this lower guy's opinion. Everything else might be the same in the economy, the same fundamentals in the economy, but if there is more leverage, the marginal buyer will be a more optimistic person and the price will rise. That is completely contrary to the standard view that price is always equal to fundamental value.

Natural Buyers Theory of Price



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Natural buyers

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Public

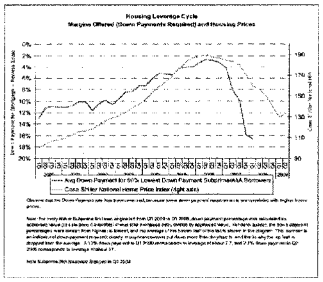
h=0

So, what is the reason for the valuation difference between people? Why are there differences in attitude? Well, one is risk tolerance: many people just can absorb risk more easily than others; they are willing to pay more because they are not as scared of the asset. Some people are more risk tolerant because they know how to hedge. Some people, I will skip a couple of other reasons listed on my slides, some get higher utility for holding the asset, for example living in a house. A New York banker lending the money would not get the same utility from living in a house as the buyer does. Some people know how to use the asset more profitably than others; a farmer in the Midwest might know how to get more out of his farm than the banker lending him the money. Finally, and most simply, it may be that some people are just more optimistic about the future value of the asset than others. So, all these different reasons contribute to the heterogeneity between people and their outlooks on the value of assets today. So, as I said, in the standard theory the asset price is equal to the fundamental value but that theory explicitly ignores heterogeneity, it assumes that once people have the same information, they are all going to think the same thing about the value of the asset. In my "natural buyers" theory of valuation, there is an irreducible difference in the views of different people.

Getting back to the leverage cycle, the leverage cycle simply asserts that there is too much leverage in normal times and therefore too-high asset prices and there is too little leverage in crisis time and therefore too-low asset prices. The cycle recurs over and over again. Leverage, and not fundamentals alone, partly determines asset prices. As leverage goes up and down, asset prices go up and down and that is damaging to the economy.

Let me just give you a taste of how dramatically leverage has changed. Consider the so-called toxic mortgage securities, some of which are triple-A and some of which are not triple-A. You know this is a technical word, 'toxic mortgage securities', it is the technical word that Summers and everyone else is using to describe assets the banks were holding whose prices are now in doubt. A bank in 2006, at the height of leverage, if they wanted to buy such a AAA mortgage security, could pay 1.6% in cash and borrow the other 98.4%. That is 60 times leverage. I went through the toxic mortgage securities security by security and found out how much money would have been needed to purchase of all these in 2006. The assets altogether were worth $2.5 trillion in 2006, and on average the leverage was 16 to 1. That means $150 billion of cash was needed to buy $2.5 trillion dollars of assets, the other $2.35 trillion was borrowed. In 2006 there were two people, Bill Gates and Warren Buffett, who between them, had 150 billion dollars. So, two people could have bought all of the mortgage toxic assets in the entire country in 2006! You see it would have been possible to cut the continuum not in half, not here in our picture, but way up here, with just two people buying. Fortunately Bill Gates and Warren Buffett were not the most optimistic people, but with that kind of leverage available this dividing point was very high and the price represented the opinion of a very optimistic marginal buyer. By the end of 2008 leverage collapsed in many sectors, especially in the toxic mortgage security sectors and went down from 16 to 1, to 1.2 to 1. The marginal buyer was much less optimistic, and the prices collapsed as well.

The same thing happened with borrowing on homes. I am going to show you a graph of how high leverage got, you could put 3% down in 2006 to buy a home, now you have to put 25% or 30% down, unless you get a Government loan. The Government is basically the only mortgage lender, and is probably overleveraging. I am going to come back to what the Government is doing in the United States now with home lending. But I want to show you a graph here to illustrate this. The green line is the famous Case-Shiller Housing Price Index, so here you see that in January 2000 it is normalized to be 100. Bob Shiller, my colleague at Yale, is famous, as you know, for his irrational exuberance theory. He said: look, housing prices were stable for a long time, then suddenly they went up from 2000 to 2006 because of a crazy irrational exuberance to 190, they went up 90%. Then people got worried, the narrative changed, they got upset, people started telling bad stories and everybody was telling each other bad stories and the housing prices collapsed to 130 in 2009 and now they are going up a tiny bit again. So, that is Shiller's famous graph, containing data he collected. His explanation is also famous, that it is all irrational exuberance, people's animal spirits. I am offering a different explanation, based on leverage. I looked loan by loan for all the non-government mortgage loans in America (you can get loan-by-loan data for non-government loans but not for government loans) and I checked what the leverage was. I measured this by the loan-to value (LTV), or equivalently the down-payment. You see on the vertical axis this is 100% LTV or equivalently, 0% down-payment, then 98% LTV or 2% down-payment, then 97% LTV or 3% down-payment and so on. Every month I looked at what the down-payment was on each new house mortgage. In this graph I took the average down-payment for the 50% of people who had the lowest down-payment. I chose this half because it is a conservative estimate of how low a down-payment you easily could have got if you wanted to. The other half of the people chose to make higher down-payments, not because they had to but because they were more conservative. But the aggressive half of the people were able to get these loans and actually chose them, so the down-payments depicted in this graph really were offered and a lot of people really took them. In 2000 the graph shows they put down 14% to buy a house, on average. As the years went by the down-payment went to 6% and to 4%, then to 3%. By 2006 people were putting down less than 3% to buy a house. After the first quarter of 2006 you can see that leverage suddenly changed direction and went down, that is, you had to put much higher down-payments. Leverage collapsed, and down-payments went very quickly to 25% and 30% in 2007 and 2008. At that point the private non-government loan market disappeared. Notice that the down-payment graph (written as loan to value so low down-payment means high loan to value) displays exactly the same shape as the price graph. Loan to value reaches its peak of just over 97% (just less than 3% down-payment) in exactly the same quarter of 2006 as housing prices reaches its peak. And then LTV plummets and housing prices follow it down. So my theory is that yes, irrational exuberance, optimism, animal spirits, maybe that was an important factor, I don't doubt it, but another very important factor was leverage. Leverage went up, prices went up. Leverage went down, prices went down. Ok? And the interest rate was not really changing so drastically all this time, so during this time leverage was a more important determinant of asset prices than the interest rate. That is basically my theory.



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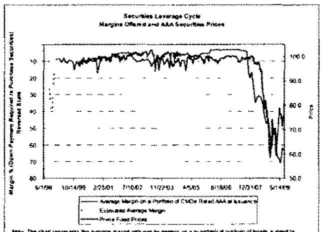
Let me show you another graph, the same kind of graph, but for mortgage securities, the assets Wall Street investors trade. For these assets, down-payment histories are much harder to get, because the investment banks that offer the loans keep the numbers private. And the Federal Reserve has not bothered to keep track of them! But let us proceed in the same way we did for housing. First we begin with prices. The red line is the history of an index of bond prices on AAA prime mortgage securities floaters, compiled by JP Morgan. The mortgages underlying these securities are taken by people with perfect credit ratings, stable jobs, you could not ask for better quality people. They tend to be richer than the average, because this is not the Government Freddie Mac loans, these are mostly Jumbo loans, so they are taken by people who get big houses. These people have nearly perfect credit ratings and if you look at the price history for these bonds starting in 1999-2000, that is from the date the index begins, you see basically nothing but 100. The value, the red, is 100, it just stays around a hundred; since they are floaters the price moves only a tiny bit because of the interest rate, and basically it stays around a hundred from 1999-2007. Then in 2007, the middle of 2007, the price index starts to collapse, going down to 60 in late 2008 and then it goes back up to 80 toward the end of 2009. The crash of these prices in 2007-2009 is a symptom of the crisis. Banks and other financial institutions were losing money on bonds just like these when their prices fell from 100 to 60. These same investors made a lot of money in 2009 when the prices went back up from 60 to 80. What explains this amazing change in prices? Shiller might well say that in 2007 panic set in, people thought the financial system was imploding and they sold off the bonds. He might say that as confidence came back in 2009, prices rose again: another tale of irrational exuberance. Now, he might also argue that rationality could not possibly explain these price moves. A price of 60 means basically that a rational buyer is forecasting 40% losses on the underlying mortgages. A 40% loss could happen if 80% of the homeowners got thrown out of their homes for not paying, and then the lenders only recouped 50% of the loan value selling the house. For such high quality homeowners such numbers seem absurd. For one thing, it would mean the whole country was on the verge of collapse. The losses so far for these bonds are round 3%, 4%, you know, or 6%, something like that, so that would explain a price drop from 100 to 94. The price went from 100 to 60 and then back to 80! I have a different explanation for these price changes, different from irrational exuberance, based on leverage. The blue line represents the margin that you had to put down to buy AAA securities, or equivalently the loan to value, all the way back to 1998. How did I get these data? I should say that I got these data because I helped start a mortgage hedge fund, called Ellington Capital Management, which I should reveal, in case you think that experience has biased me in any way, I helped start a mortgage hedge fund, and the blue line is the record Ellington kept of the margins that banks were offering us. The Federal Reserve should be keeping data like this, but they don't have it. They asked me for these data a year or two ago. I am going to come back to the Fed and data in a little while. But anyway, the record shows that in early 1998 Ellington had to put down 10% to buy a AAA security, and then suddenly the down-payment shot up to 40% in late 1998. This was the last leverage cycle crisis in the US. In that 1998 crisis the famous hedge fund Long-Term Capital, started by two Nobel Prize winners in finance, went out of business. I do not have price data back that far, but obviously prices collapsed during the crisis: that is why Long Term went out of business. Just a few months later the margins went back down to 10%: the leverage cycle crisis of 1998 lasted only a few months. By 2006 the margins had fallen to 5%, so in 2006 you could be 20 to 1 leveraged. Then in 2007 the leverage collapsed. You can see in the graph that margins rose from 5% to 70% in 2008. Then leverage started to come back. You see the amazing thing is that once again leverage and prices go together. As leverage plummeted in 2007-8 from 20 to 1 to 1.5 to 1, prices collapsed. The optimistic buyers at the top of the continuum could no longer hold all the securities; the marginal buyer became some investor who did not really want them, or did not really know much about them, and so he was willing to pay much less. When leverage started back up in 2009, prices went back up. That is the essence of my theory.



Note: The chart represents the average margin required by dealers on a hypothetical portfolio of bonds subject to certain adjustments noted below. Observe that the Margin % axis has been reversed, since lower margins are correlated with higher prices.

The portfolio evolved over time, and changes in average margin reflect changes in composition as well as changes in margins of particular securities. In the period following Aug. 2008, a substantial part of the increase in margins is due to bonds that could no longer be used as collateral after being downgraded, or for other reasons, and hence count as 100% margin.

[20] The same three things happen in every crash, including the crisis of 2007-2009. First, there is bad news. But there is often bad news without a crash, so I am talking here about a peculiar kind of bad news: it is bad news that creates more uncertainty, or "scary" bad news. All news reduces uncertainty on average. That is why it is news, you learn something from it. But some kinds of bad news actually can increase uncertainty and increase volatility. For example, suppose you are waiting at the gate to take an airplane. You know there is a small chance the plane will be late. If a minute goes by and nothing happens you are a little surer the plane will be on time. That is what usually happens. Sometimes an announcement is made that the plane will be delayed by 10 minutes; this creates much more uncertainty, because now you think there is a pretty good chance the delay could be much longer. When a bank suddenly announces a $5 billion loss, investors immediately wonder whether the losses will be much bigger. That is the kind of news that makes lenders nervous. And it is exactly what happened in our crisis, especially with subprime loans. People used to think that losses on subprime loans would be on average 4% and somewhere between 2% and 6%. All of a sudden people thought: it might be 30%, that is bad news. But it is not just that they thought it could be 30%, they were not sure, maybe it could be 80%,that is the scary part: they were uncertain about how bad the next piece of news was going to be and that is when they started tightening all their lending. Once there is bad news that causes more volatility, the lenders ask for more collateral and leverage plummets. That is the second event of a crisis. The bad news naturally lowers prices, causing the owners (many of whom are leveraged) to lose huge amounts of money. Since it is the optimists who lose the money, the top of the continuum of people I mentioned earlier gets wiped out. That is the third symptom of a crisis. So after the scary bad news many optimists are wiped out and the remaining optimists cannot borrow as much. So the marginal buyer is far lower down the continuum. These three disasters (scary bad news, tighter leverage, and losses for the optimists) then feed back on each other. Tighter leverage and collateral requirements force more optimistic leveraged owners to sell, further depressing prices and causing further losses for them, which in turn alarms lenders more who tighten collateral requirements again, and so on. Eventually many borrowers/buyers go bankrupt or else they go insolvent or underwater, like homeowners and banks today. They are still alive, but who knows whether they will survive and pay eventually, or just walk away? That creates more uncertainty, which leads for further feedbacks on lending and so on. Eventually things settle down and the prices stabilize at lower levels. The worst seems to be over. Lenders

become less nervous and leverage creeps back up. It is a big opportunity for the optimists who survived the crisis. So, that is my basic theory of the leverage cycle. It seems to describe the crisis we are going through right now quite accurately. And I wrote it 10 years ago!

Anyway, this kind of cycle of leverage going up, leverage going down, prices going up, prices going down, happens over and over again. I myself have lived through three of these crises, in 1994, 1998 and this recent crisis, which I should say probably is going to go on to 2010, so the crisis of 2007- 2010.

What is so bad about the leverage cycle? So what if prices go up and down, and some optimists get wiped out? Of course every leverage cycle has its particulars, but there are definitely some generic problems. The first is that when leverage gets very high, very few people who are the most optimistic, they can buy all the assets, they are setting the price. Why should the very craziest, possibly, part of the population, be determining the price of our most important asset? If they could not borrow as much, the marginal buyer would be lower and the price would be set by a more middle-of-the-road person. Second, high prices lead to more construction: for example, once housing prices go high, of course people are going to construct more, you get a lot of projects happening that would not have happened otherwise. Similarly when prices fall in the crisis stage, construction and new activity more generally grinds to a halt. Even if we thought the same total construction would occur over the cycle if prices stayed stable, we might worry that the mix of projects is less good over a more volatile cycle. Third, and much more importantly, the people doing the construction at different stages of the cycle are likely to be different. When the markets collapse and the prices fall down many activities stop: in the recent crisis for a time people could not get new credit cards, because the prices of credit card loans fell so low, no one would let you get a new credit card. Many people could not borrow money to get a car, because the price of car loans fell so far. So, the general public that does not participate in the leverage cycle suffers. We have to protect the general public from the low stage of the leverage cycle. Smoothing the leverage cycle would provide a kind of insurance to the general public that they cannot buy on the market. A fourth problem with the leverage cycle is that if the news continues to be good, the people borrowing a lot, the optimists are making a huge amount of money, because they are leveraging. That is what leveraging means: to make a lot of money when things go well. Inequality is a big mystery in America: why did inequality rise so much? The pundits cannot really explain it. I think the leverage cycle has a lot to do with it: people who were leveraging and seeing their fortune rise just because news was good and they were so leveraged, of course they got rich. Growing inequality is another problem of the leverage cycle. A fifth problem with the cycle is that the optimists, the ones who drive the economy, the ones who are doing all the buying and the borrowing, when they fail and go out of business, we are now lacking and missing a very important part of our economy or if they are still there, but they are under water, a very important part of our economy is not functioning correctly. So, that is the debt overhanging problem. When these people are under water, they don't behave the same way they do when they are sound. Banks that are near insolvency hunker down and stop making loans, even if they are good investments. Homeowners who are under water do not make repairs to their houses, even if they would raise the value of the house more than the cost of the repair, because they fear they will eventually lose the house anyway to foreclosure. A sixth problem is that when the down cycle comes and people and institutions default, confiscating the collateral is a very expensive operation. In the United States, when a subprime loan is made and the homeowner defaults, it takes eighteen months to throw him out of the house. During those eighteen months he does not make his monthly loan payments, of course, he does not pay his taxes, he does not fix the house and you know, a few months before the end he usually leaves the house and then the house gets vandalized and trashed, you know, all the coppers ripped out, it is a ruined house and on average now, these homes are being sold for a quarter of the price of the loan: 25% is what you get out: a terrible waste. And each time a homeowner is thrown out of his house, the houses nearby fall in value, and then it is more likely their owners will walk away from their loans and the waste and destruction spreads.

Now, why was the crisis worse this time than any previous time, maybe all the way back to the Great Depression? The most important reason is that leverage got higher than ever before, then fell faster than ever before. I don't have time to explain the forces that made leverage get so high. One is that we were in a long tranquil period; the period called the great moderation, with very low volatility. Another force is the securitization boom. Securitization is a remarkable mechanism for spreading risk and making lenders feel safer so they will lend more money. A second important reason for the severity of this leverage cycle is that it spread to housing and it infected all the banks. Never in our history were so many homeowners allowed to put so little money down. More people and more banks are under water than at any time since the Depression: they owe more money than the value of their operations. When you take somebody who owes more money than his house is worth, he is not going to fix the house, he is not going to take care of it, he is not even going to try to sell it, there is no point in selling it, he is not going to tell his children it is going to be theirs. Eventually he is going to trash the house when he has to leave it and there are going to be huge losses. But what is true for the home owners is also true for the banks: they are behaving horribly. Why are they behaving horribly? Partly because they are too scared to lend, partly because they know that they are underwater. The Government has not revealed how far underwater they are, but they know that they are underwater and they just want to disguise that from the public. The banks are just hanging on, waiting till they get more and more money from Government subsidies, until they are out from being underwater, and during that time they are just not lending. When important entities go underwater, they don't behave efficiently and when they don't behave efficiently, lots of bad things happen. That is the main thing that is going on now in the country. A third reason this leverage cycle got so bad I already alluded to: the double leverage cycle. Housing got much more leveraged, people could put almost nothing down to buy a house, but then, when the housing loans were securitized and packaged together into securities, the buyers' of those could also leverage tremendously, 60 to 1 or 16 to 1, as I said. The housing leverage cycle and the mortgage security leverage cycle interact with each other, there is a feedback between the two. If you can leverage securities very easily, security prices will be high. That means mortgages will sell for a higher price, because they can be packaged into valuable securities. Homeowners effectively will be able to borrow more money on the same house, i.e. houses will be leveraged more. Housing prices will go up. Since the houses back the mortgages which back the securities, lenders who take securities as collateral will feel safer and allow for more leverage on securities. Thus higher leverage on securities makes for higher leverage on mortgages which leads to higher leverage on securities. There is a feedback. Of course it works in the reverse direction too. When leverage starts to go down in securities it will go down in housing, which will make housing prices fall and increase defaults and lead back to lower leverage on securities.

There is a fourth reason this leverage cycle has been so violent, which also gives an explanation for a so-far unresolved puzzle: what caused this cycle to go bad precisely when it did? Why did housing prices start to go down in 2006? Why did leverage start to go down here? I believe the turning point was the standardization of the credit default swap or CDS at the end of 2005. (The CDS, I think, was mentioned in the last session.) CDS contracts are insurance on various bonds; they have been around since the 1990s for corporate bonds, but did not become standardized in mortgages until late 2005. Their creation gave pessimists the ability to leverage for the first time in the mortgage market. I said at the beginning of my talk that when leverage increased, the pessimists at the bottom of the continuum could do nothing but watch from the sidelines, because it was difficult to sell short. With the CDS market, a pessimist could buy insurance, effectively betting on the asset going down in value (when he would collect his insurance payment). Moreover, because there were no limits to the amount of insurance, pessimists could buy much more insurance on the bonds than the bonds were worth themselves, effectively leveraging his negative position. Just like a few optimists could by themselves prop prices up by using leverage, so a few pessimists could push the market down by buying lots of CDS insurance. That is the reason why the securities prices started to fall, and as lenders realized securities prices might fall, they realized that there was going to be more danger and so they asked for more collateral and that forced the prices to fall much further and so started the negative feedback to housing prices and back that I described in the last paragraph. People say, so what was the big shock that started the crisis, and in particular, started the decline in housing prices in 2006? I think the answer is first, the market simply ran out of new people to lure into homes by offering such low down-payment mortgages. That stopped the increase in prices. And second, the market engineered its own negative shock by creating the CDS, which started the prices down. Had the CDS been actively traded from the beginning, prices might never have got so high. But CDS only got going at the very peak of the cycle, when prices were very high. So there was a long way for prices to go down to get to the level they might have been had there been CDS from the beginning.

The CDS market by itself is a topic of great relevance to my theme of leverage. By buying say $5 of insurance on $1 of a bond, the pessimists could effectively leverage their negative bet. A 1% drop in the value of the bond (say because the market perceived a 1% increase in the chance of default) would increase the pessimists insurance position by 5 cents. The writers of the insurance tended to be the big banks and AAA companies, like AIG, and many buyers of insurance did not insist that these writers put up collateral. This effectively allowed optimists to lever more as well, partly reducing the negative impact of CDS on price, but creating more losses when the losses came. I do not have the time to get into this in detail, but there is also an interesting connection between CDS and the CDO market. Since the people writing the CDS insurance were taking a similar position to owning mortgages, CDS were used in the CDO market to create synthetic mortgages. This is another way to see why the introduction of CDS lowered mortgage prices: they were tantamount to increasing the supply of mortgages. CDOs represent the securitization of BBB mortgages. As with any securitization, they allowed optimistic investors in BBB mortgages to leverage more, and so tended at first to raise the prices of BBB mortgages: as long as the BBB mortgages were real mortgages that could be leveraged more, fewer optimistic buyers were needed to hold them. But over time more and more of the BBB mortgages in the CDOs were synthetically created out of CDS. To the extent that the CDO BBB mortgages were synthetic, they in effect created more supply of mortgages and thus started to depress the prices of mortgages.

What should we do about the leverage cycle? I am finally coming to the punch line. The first thing to do is to monitor it. You cannot solve a problem until you can recognize and measure it. The Government, the Fed, should be collecting the kind of leverage data that I have shown you in those two charts. It is astonishing to me that the Fed did not have these data and it is astonishing that to the best of my knowledge, they are still not collecting such data. They should be going to every big bank and saying: what are the margins you are giving on your loans? They should go to all these big banks that lend in the US, whether they are American banks, or foreign banks like Crédit Suisse, and force them to report the leverage they are permitting borrowers to take on all their loans. That especially includes the Repo market. Had they been doing this ten years ago, the Fed would have seen in that graph that leverage, you know, suddenly went up from 10 to 1 to 20 to 1 and they would have known that something had happened in the economy, they would have known that they had to worry about it. The Fed didn't even have the data in the chart I showed you about leverage in housing, which is a very easy thing to get, the Fed was not monitoring even that. I never saw a picture like that in any newspaper or Fed publication. The Fed should be collecting this data and making it public, so everybody knows what leverage is in the economy. The Fed should monitor all CDS contracts, and the margins they require. Putting CDS on an exchange would make this much simpoler. The Fed should also be monitoring the leverage at all the big investment firms, including hedge funds. Summary figures of security leverage numbers (LTV by security type) and investor leverage numbers (what is the average leverage across securities at hedge funds) should be published monthly. Publishing leverage numbers would focus the public's attention on leverage and keep the pressure on the Fed to act. Next the Fed should officially commit to managing economy wide leverage. In normal times leverage will get too high; that is the dynamic. Leverage has to be regulated and held down. People usually ask me, how will the Fed know when leverage is too high? I answer by asking how does the Fed know when interest rates are too low? Typically the Fed monitors the interest rate and monitors prices. If interest rates are falling and inflation is rapidly rising, the Fed knows it is time to step in. The Fed could act on leverage the same way. If margins on some asset like housing were rapidly falling, while the price of housing was rapidly rising, the Fed would be alerted to act. Of course it will take time to iron out the optimal intervention. But we have to start somewhere.

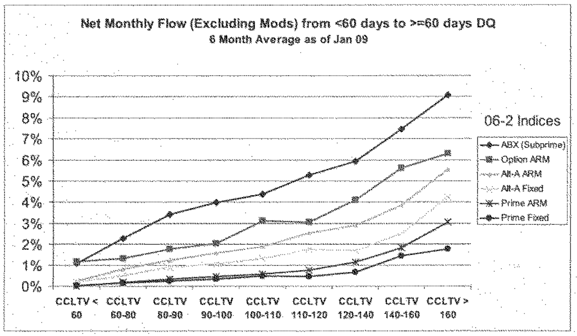
There are four reasons why monitoring and regulating securities leverage is more important than monitoring investor leverage at a few selected firms (like at the big banks). The first is that many other firms leverage, and if these were not monitored, then economy-wide leverage might be underestimated. In particular, if leverage is regulated at big banks but not elsewhere, leverage will move out of the banking sector and into the unmonitored sector. Second, investor leverage often moves in a misleading direction. Just as a crisis approaches, and security leverage is dropping like a stone, many investors' equity will be falling, and so their debt/equity ratios will be rising, giving the wrong impression that leverage is on the way up. Third, securities leverage is harder to lie about. For every loan there is a borrower and a lender, so the government would be getting all the reported numbers checked with the counterparty. Fourth and finally, it seems to me that it is harder to exert political pressure on a regulator to fudge or ignore security leverage than it is to pressure him into allowing a firm to increase its investor leverage.

What about in the crisis? How do you get out of a crisis, like the one we are in now? My answer is that you have to reverse the problems that always arise in the crises. The first is that all these players are underwater, well, the first is the uncertainty, remember? I said there was scary bad news that created uncertainty. So you have to contain the uncertainty. And how do you contain the uncertainty? Well, it started in the mortgage market with foreclosures, not knowing whether the losses would be 80% or 30% or 10%. You have to somehow get the housing market under control and the way to do that, as I will say in the next slide, is to write down principal. A related part of the uncertainty is the banking sector, resolving which of those will fail. Secondly, leverage is collapsing, so the Fed and the Government have to step in and go around the banks, who are refusing to lend, and lend directly. Not at a lower interest rate, that is irrelevant. The Fed should lend at the same interest rate, but with less collateral. Thirdly, the most optimistic buyers have been wiped out, so the Treasury must step in and replace some of this buying power. The problem here is that many of the securities are very complex and opaque. The government is in no position to figure out which securities to buy, and at what price. So they must partner with private buyers, or buy generic securities.

So what have the Fed and Treasury done to get us out of the crisis? They bailed out a number of failing banks. They also seem to have slowly moved toward embracing the principles enunciated here. But they have not implemented the plan in exactly the way I would have recommended. Let me concentrate on aspects 1 and 2, the writing down of principal and the re-leveraging of the economy, starting with leverage.

The Fed recognized that the collapse in leverage in late 2008 had shut down many markets, and it moved to restore leverage in several targeted areas through a program called TALF. It said: it has become impossible to get a new credit card, so the Fed is going to the securitized credit-card market and lending to buyers at leverage of 20 to 1. You may not realize, but the Federal Reserve today is lending at 20-to-1 leverage on securitized credit cards, 20-to-1 leverage on new auto loans, 20-to-1 leverage on a bunch of different things, so the Fed has picked out a few little markets and leveraged them 20-to-1. The housing authority in America, FHA is now lending with 3% down-payments again. They are leveraging home owners for certain classes of people, letting them buy with only 3% down, so they have recognized that they have to re-leverage but in my opinion they are doing it in exactly the wrong way, by leveraging at almost the same dangerous ratio we had before in a few little places. What they should have done instead is leverage many more securities, but not at 20-to-1, but rather something like 2-to-1. They should, say, on these mortgage securities that people used to be able to put, you know, 1.6% down, the Fed should lend with 50% down, instead of 1.6% down, that would be a safe way of lending that would restore leverage to a rational level and it would not astronomically leverage in a few small sectors. And it would actually help those small sectors more than they are being helped by the excessive leverage the Fed is doing in those small sectors. Let me explain why. There is a very important point here, I think, that the famous American economist James Tobin called Q, by which he meant the ratio of old asset prices to new construction cost. It is hard to securitize new mortgages today; private lenders are not eager to give anyone a new mortgage. Why is that? Because you can buy an old mortgage promise of $100 from a very good borrower for $65 or $80: remember I said the prices went down to $60? Ok, now it is $80. Why should you lend (i.e. pay) $100 to a new borrower when you can pay just $80 to buy someone else's promise to repay $100 from three years ago who is just as good a borrower? The Fed reasons that if you let the buyer of the new promise leverage 20-to-1, so that he only needs to put $5 down in cash, then he might be willing to buy the new promise at a price of $100 instead of putting down all $80 in cash to buy the old promise. Now you see why the leverage needs to be so high. The problem is that this leverage is dangerously high. And more importantly, there are many other new things besides credit cards and auto loans that the Fed has not thought to leverage which will not get loans if investors can better spend their money on cheap legacy assets. In my opinion you have to get all the legacy prices back to a reasonable level in order to get people to do many new things. If the old things have such a low price, people will invest in the old things, they will not do anything new. So, the Fed is making a mistake trying to directly prop up a few targeted new things. If it leveraged all the old assets at 2-to-1, their prices would rise, they would not be such attractive investments, and the Fed could prop up the new auto loans with much less than 20-to-1 leverage. Of course there is nothing magical about 2-to-1 leverage. It might need to be a bit higher. And some sectors could be leveraged more than others. But my recommendation is to leverage everything modestly instead of a few narrowly targeted areas to extremes.

I am going to close now with this last slide, this is my last slide, describing what is going on in housing. I said earlier that millions of people are underwater. Let us see how they act. On the horizontal axis I measure how far under water the house is. I record the loan-to-value LTV ratio, so 160 means, if you add up all the loans on a house they are 160% of the value of the house. That would be the case for example if the house is now worth $100,000, and the amount outstanding on the first and second mortgages add up to $160,000. On the vertical axis we measure what percentage of homeowners who were current or 30 days late become 60 days delinquent on their mortgages. This is called the *monthly* default rate. Here we have prime, subprime, and other categories of borrowers. Let's look at the subprime borrowers. When they are 140 LTV it is 6% a month! This isn't a year, it is a month! The guys who are 160 LTV, it is 8% a month. That means in a year they will have all defaulted, almost every single one of them. They are defaulting at an astronomical rate. Why are they defaulting? Because they would be crazy not to default! If their loan is 160% of the value of the house and it is a hard economic time, how can the parents tell their children, you know: we are going to stop eating and do all kinds of other stuff to pay off our loan, when they could just walk away from their house and get a much cheaper house and save themselves 60,000 dollars (assuming their house is worth $100,000)? They are not going to make that decision, so, in fact, they are defaulting. Of course homeowners who have equity in their houses do not default. Why would they, when they could sell the house and grab the equity?



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The really interesting thing is that when these subprime homeowners default, the lender only gets back 25% of his loan. In our example, that means the lender would only get back $40,000. One quarter of 160 is 40. Now, if the house is worth 100 and the loan is 160 and throwing the owner out of the house you can only get 40 back, why not cut the loan to 80? Tell the guy: you only owe 80? Then you get 80 back, because the guy will try to fix the house and sell it for 100 to make a profit, or he will realize he has got equity back in his house and he will pay the 80. Either way, it is better for the lender and also for the borrower. And the government pays nothing at all. So cutting principal, I think, is the only way to make all these underwater homeowners, who are not behaving properly anymore, behave properly. Reducing the principal is obviously good for the home owners, but it is also good for the lenders. This may strike you as paradoxical. But it is true. I mentioned earlier that I had helped start a hedge fund. We were unfortunately among the buyers of these subprime securities. But I can tell you that we, as lenders, would love to see the loan, half the loan forgiven, because it the end it would save us money. Some people just want to punish these subprime guys and throw them out of their houses. But I do not agree that these subprime borrowers are necessarily bad people. You know, it is not their fault that the lender did not ask for more collateral, it was up to the lender to demand more money down, not up to the borrower. If a grocer wants to sell you something at half his cost, are you to blame when he goes bankrupt? It is the grocer, the lender, who sets too low collateral. So why should we blame the borrower who is in the house?

If you write down the principal to a little below the current value of the house, you are going to save the home owner and you are also going to save the lender. And the Government does not have to pay a penny; the lender should absorb the loss of principal. So if this is so good for everybody, why hasn't this happened? I can give a different explanation depending on whether the loan has been securitized, or held as a whole loan in some bank portfolio. I don't have time to talk about these reasons now; perhaps during the question period I can elaborate. But let me note that my hedge fund, which holds mortgage bonds that have been securitized, can't talk to the home owners. Only the Servicer of the deal can talk to the home owners and modify the loans. But they don't have any incentive to cut the principal. The Obama plan in fact, encourages them not to cut the principal. Maybe in questions I will explain why that is. It has to do with the fact that the Servicers are mostly all owned by the four biggest banks.

The rest of the loans that are not securitized, most of them are held by the big banks. If these banks write the loans down from 160 to 80, they have to immediately recognize the 50% loss. They don't want to recognize the loss immediately, because they are trying to hide from the public that they might be insolvent. So they will not recognize the loss. Eventually they are only going to get 40 back, so the loan should only be worth 40 to them now, and exchanging something worth 40 for something worth 80 should be in their interest. But they can still mark the loan at 160, or close to that, because maybe the guy is still paying. Even though they know very well that, within a year, he is going to default and then they are going to get 40 back, they are not required any more to mark it at 40. Marking to market has been suspended. The desire to stay solvent in the short run, and so not jeopardize the government bailout package all the banks are getting, is worth more to the banks then getting 80 instead of 40 in the long run on their loans.

The banks who are underwater behave the same way homeowners do who are underwater. I mean, why make home repairs if somebody is going to throw you out of your home eventually? Much better if you are an insolvent bank is to pay money out as dividends, or as bonuses, then to plow it back into the firm. if they don't have equity, they are not going to behave in the interest of themselves or the economy. Some people have taken to calling these underwater homeowners and banks zombies, because they live on but they act dead. To reduce the uncertainty in the economy we must resolve their debt positions. The choice should be between rushing them into foreclosure or bankruptcy, or else writing down their debts until they have positive equity. With the banks, we have to figure out some way that they should default on some of their lenders, instead of just getting the Government to subsidize them to keep paying all the lenders off.

In summary, I think that the best way to prevent a future crisis is to monitor and limit leverage. If we have another crisis, or if we want to get out of this crisis, we must reverse the three symptoms of every crisis. The first order of business is always to rationally re-leverage the system. That means restoring moderate leverage everywhere, rather than leveraging a few small sectors to too high levels. The second order of business in a really bad crisis like the one we are in today is to restore people to life, these zombie home owners and banks, by cutting some of their principal. If they are going to default anyway, let us default them now in a rational way. And thirdly, the Government is going to actually have to pay some money to replace the lost optimistic capital. I am not saying everything is for free, the Government might decide, it has got to actually pump some money into a bank or into the housing sector or something like that. Ok, I see my time is up.

Managing The Leverage Cycle

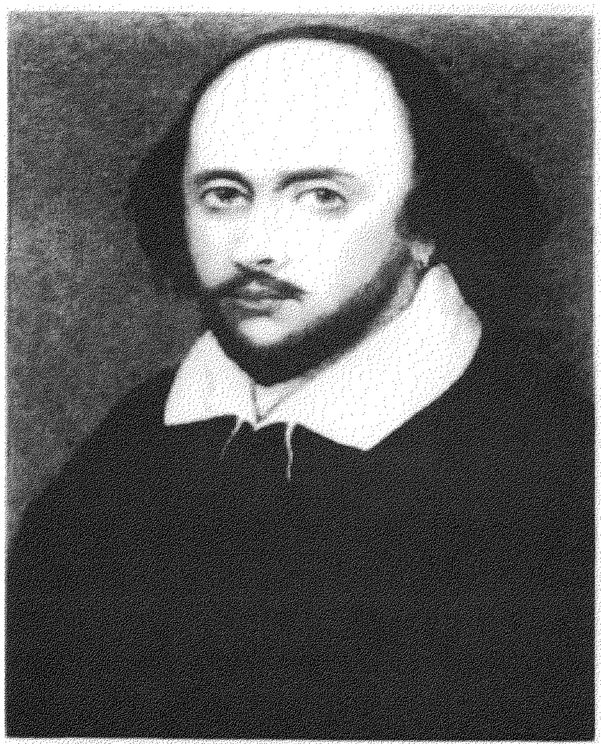
John Geanakoplos

Fed Should Manage Leverage as well as Interest Rates

- From Irving Fisher in 1890s and before it has been commonly supposed that the interest rate is the most important variable in the economy.
- When economy slows, public clamors for lower rates, and Fed obliges.
- Fed has been pumping out billions of dollars in bank loans. Fed just lowered fed funds rate in December to zero.
- But collateral rates or leverage more important in times of crisis.

Leverage Cycle Papers

- Geanakoplos 1997 “Promises Promises”
- Geanakoplos 2003 “Liquidity, Default, and Crashes: Endogenous Contracts in General Equilibrium”. Invited address World Congress 2000.
- Fostel-Geanakoplos 2008 “Leverage Cycles and the Anxious Economy”. AER.
- Geanakoplos-Zame 1997, 2002, 2005, 2009



Shakespeare got this
Right 400 years ago.

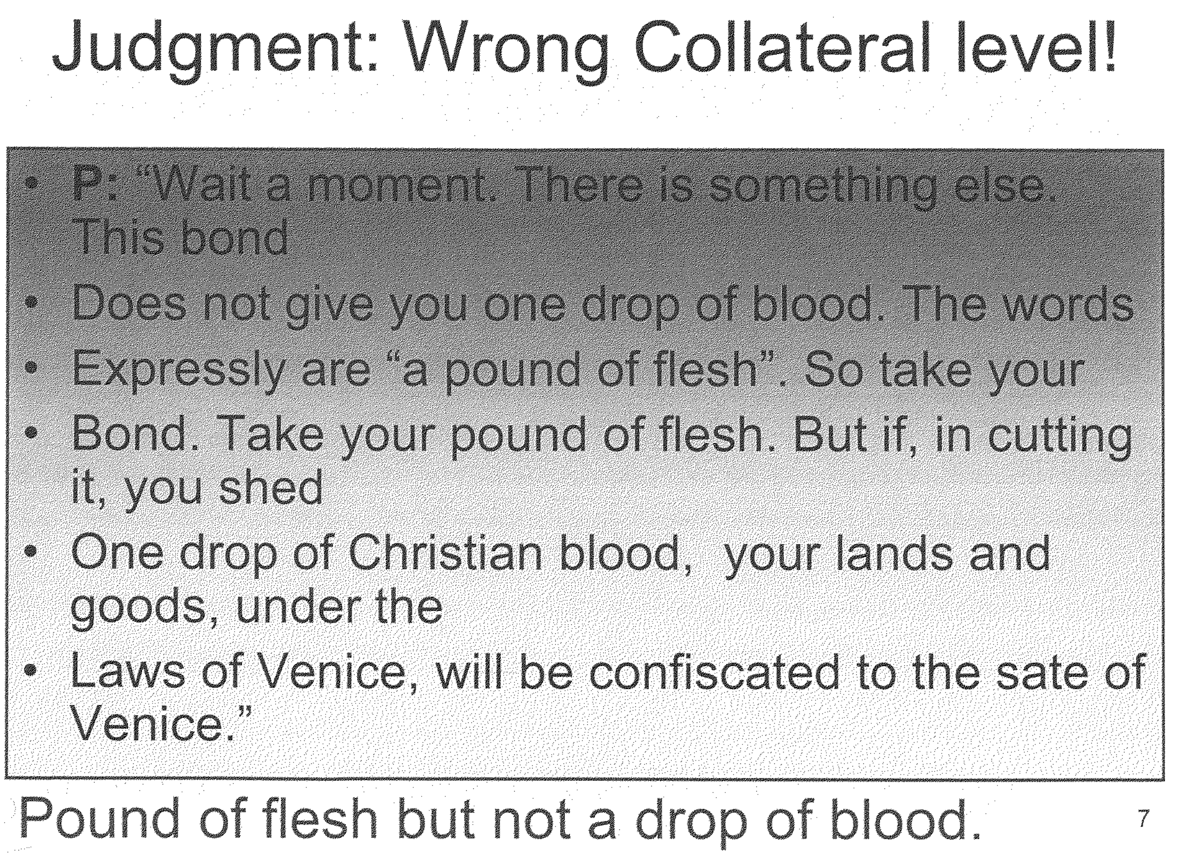
The Merchant of Venice

Negotiation

- Over interest rate (many pages)
- And over collateral.

Which did Shakespeare think more important: Interest or Collateral?

- What interest did Shylock charge? Nobody remembers.
- Everybody remembers collateral of pound of flesh.



Judgment: Wrong Collateral level!

- **P:** "Wait a moment. There is something else. This bond
- Does not give you one drop of blood. The words
- Expressly are "a pound of flesh". So take your
- Bond. Take your pound of flesh. But if, in cutting it, you shed
- One drop of Christian blood, your lands and goods, under the
- Laws of Venice, will be confiscated to the sate of Venice."

Pound of flesh but not a drop of blood.

Collateral Papers

- Bernanke-Gertler-Gilchrist 1996, 1999
- But this ignored changes in leverage.

Definition of Securities Leverage

- Collateral = Asset put up as guarantee of loan. Often a house. I will assume no-recourse loans, like housing.
- If can use $100 house to borrow $80, then:
- margin or down-payment or haircut is 20%,
- LTV is 80%,
- leverage is 5.

Equilibrium Leverage

Standard Economic Theory:

Equilibrium (supply = demand) determines interest rate.

In my theory:

Equilibrium determines Leverage as well.

Surprising that one equation can determine two variables.
In standard theory either ignore default (hence need for Collateral) or fix leverage at some constant.

What Determines Leverage

- Interest rates determined by impatience.
- Leverage determined by uncertainty about and disagreement over future collateral prices. Volatility is crucial.

Why Leverage is important

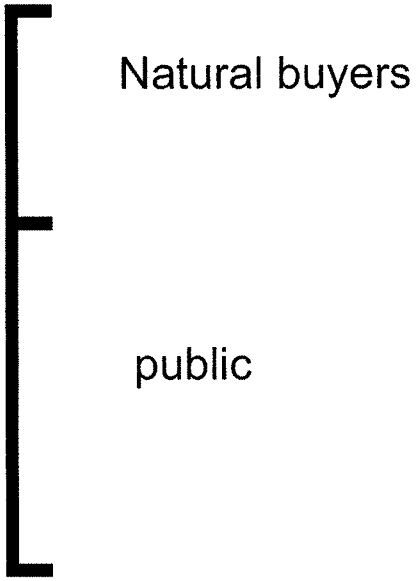
- As every trader knows, if leverage is 5, and asset moves by 1%, your return moves by 5%. If house price is $101, sell it, return $80 and make $1 on $20 = 5%.
- No-recourse collateral gives borrower the "put option" to walk away from the house. House falls in value to $0, borrower walks away and loses only $20 even though lender loses $80.
- Pundits say this has to do with crisis.
- But real significance of leverage is that it allows just a few investors to buy so many assets.

More Leverage →
Higher Asset Prices

Low Leverage →
Lower Asset Prices

- Leverage gives optimists more buying power.
- Relies on no short sales.

Natural Buyers Theory of Price



Natural buyers

public

Heterogeneous Agents

- Natural Buyers vs Public
- Differ in risk tolerance.
- Differ in ability to hedge.
- Differ in sophistication and knowledge.
- Might use assets for production.
- Might get higher utility for holding assets
  - Like houses
  - Leads to equilibrium leverage giving default
- Or just more optimistic.
  - Leads to equilibrium leverage without default, like Repo market.

Standard Theory

- Asset Price = Fundamental Value.
- Heterogeneity is missing.

Leverage Cycle

- Too much equilibrium leverage in normal times
- Too high asset prices in normal times

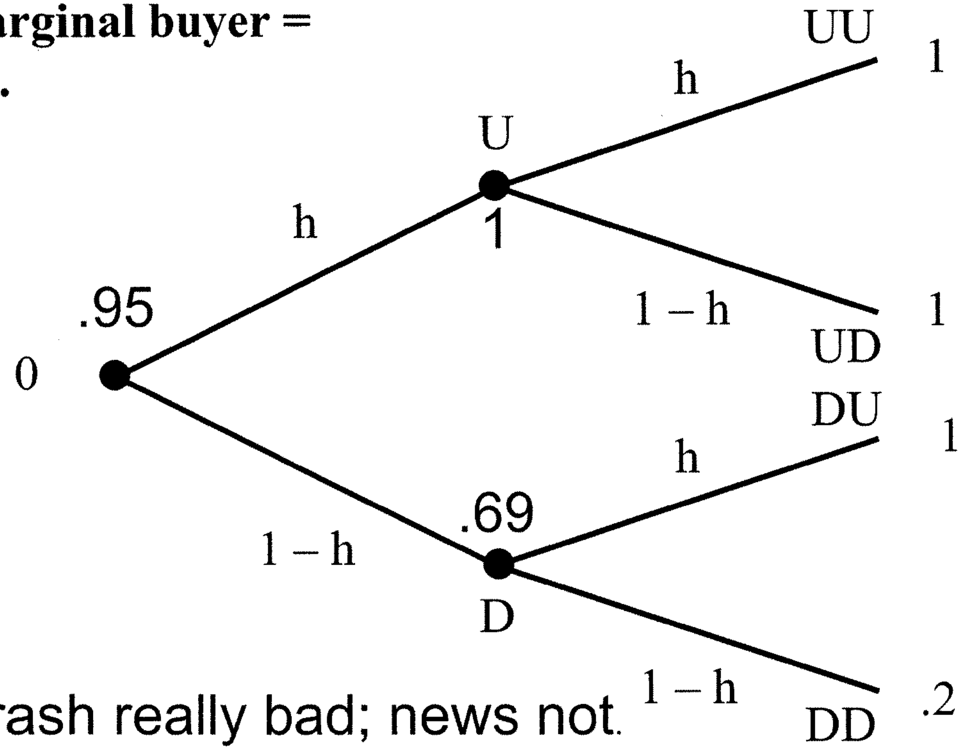
- Too little leverage in crisis
- Too low asset prices in crisis

- Recurring cyclical problem.

Leverage Cycle Crashes Always Have same three aspects

- Scary Bad news creating more uncertainty and more disagreement = high volatility
  - FORECLOSURES
- De-leveraging because nervous lenders ask for more collateral
- Leveraged buyers (optimists) crushed, some go bankrupt, others insolvent and functioning poorly

Marginal buyer = .87.



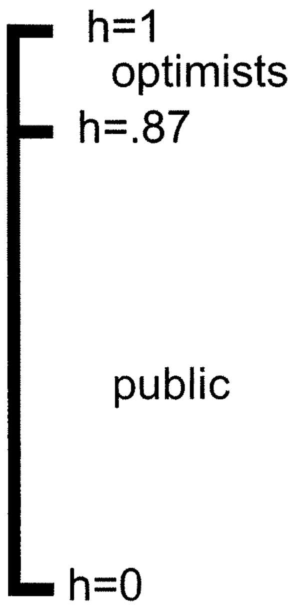
Crash really bad; news not.

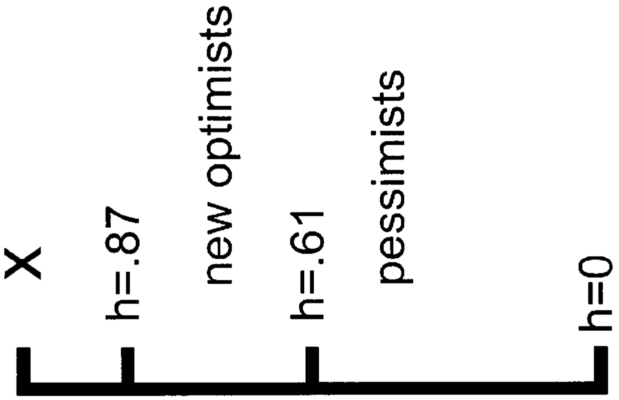
Top 13% of buyers go bankrupt.

Leverage at 0 = .95/.26 = 3.6; Leverage at D = .69/.49 = 1.4

Interest rates = 0.

Natural Buyers-Margins Theory of Crashes

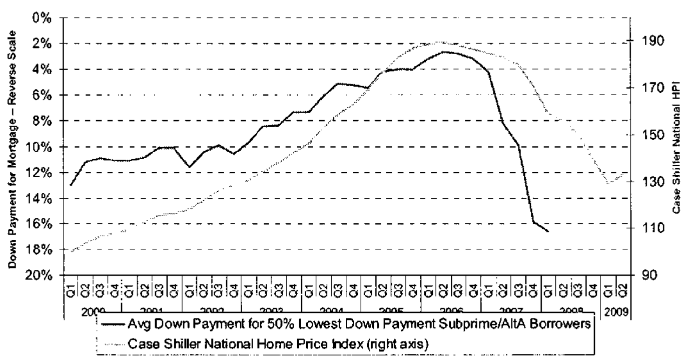



X
h=.87
new optimists
h=.61
pessimists
h=0

Recurring Leverage Cycles

- 1994 derivatives crisis, bankrupted Orange County
- 1998 emerging markets and mortgages, bankrupted Long Term Capital
- 2007-8 mortgage crash

Housing Leverage Cycle
Margins Offered (Down Payments Required) and Housing Prices

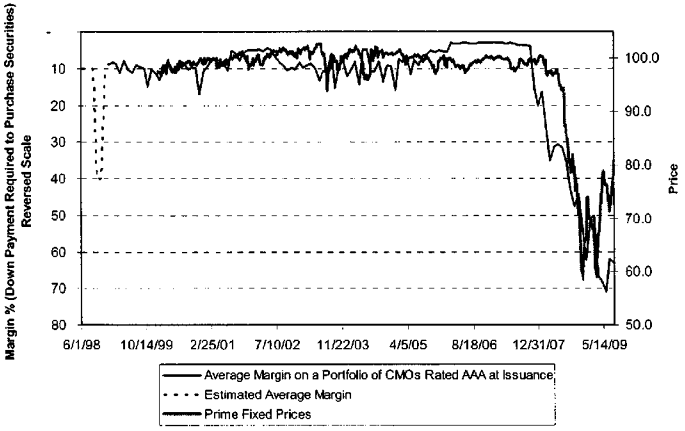


Observe that the Down Payment axis has been reversed, because lower down payment requirements are correlated with higher home prices.

Note: For every AltA or Subprime first loan originated from Q1 2000 to Q1 2008, down payment percentage was calculated as appraised value (or sale price if available) minus total mortgage debt, divided by appraised value. For each quarter, the down payment percentages were ranked from highest to lowest, and the average of the bottom half of the list is shown in the diagram. This number is an indicator of down payment required: clearly many homeowners put down more than they had to, and that is why the top half is dropped from the average. A 13% down payment in Q1 2000 corresponds to leverage of about 7.7, and 2.7% down payment in Q2 2006 corresponds to leverage of about 37.

Note Subprime/AltA Issuance Stopped in Q1 2008.

Securities Leverage Cycle
Margins Offered and AAA Securities Prices



Note: The chart represents the average margin required by dealers on a hypothetical portfolio of bonds subject to certain adjustments noted below. Observe that the Margin % axis has been reversed, since lower margins are correlated with higher prices.

The portfolio evolved over time, and changes in average margin reflect changes in composition as well as changes in margins of particular securities. In the period following Aug. 2008, a substantial part of the increase in margins is due to bonds that could no longer be used as collateral after being downgraded, or for other reasons, and hence count as 100% margin.

Leverage dramatically increased from 1999-2006

- A bank that wanted to buy a AAA mortgage security could borrow 98.4% of purchase price, paying down only 1.6% cash. That's over 60 to 1 leverage.
- Average leverage in 2006 across all $2.5 trillion of toxic mortgage securities was 16 to 1.
- So buyers only had to pay $150 billion cash, and borrow $2.35 trillion!

- Home buyers could get mortgage with 3% down in 2006, for leverage 33 to 1.

Then leverage drastically curtailed by nervous lenders wanting more collateral

- Toxic mortgage securities leverage fell to average less than 1.2 to 1.

- Homes leveraged 3 to 1 unless get government guaranteed loan

2007-9 Worst Leverage Cycle because

- Leverage got higher than ever before.
- Houses and banks further underwater making for bigger foreclosure deadweight costs
- Double leverage cycle, in housing and securities.
  - Feedback between the two
- CDS appeared for first time at peak of cycle
  - Made losses for optimists bigger than losses of asset value
  - Allowed pessimists to leverage and helped cause crash.

Why is leverage cycle so bad?

What’s so bad about so much leverage? (Even without default)

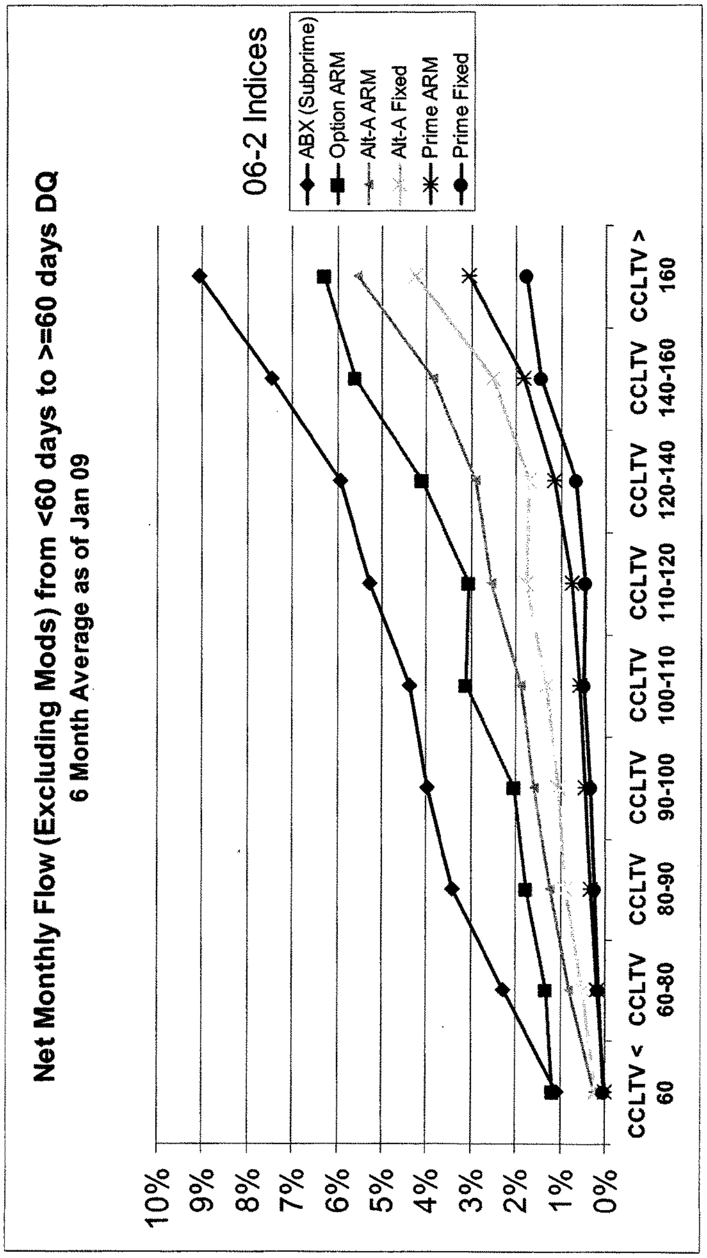
- At top so few buyers have such a big effect on prices. What if they are crazy?
- Construct many projects which look ridiculous in retrospect when cycle turns down. Costly if irreversible investment.
- Fortunes of natural buyers rise and fall through cycle. Changing inequality over cycle.
- Has real effects on economic activity, and welfare of risk averse third parties. Unfair to subject public to so much volatility. Tobin Q.
- What if optimists indispensable to economy: too big to fail

What's so bad about leverage (with default)

- Debt overhang: When underwater will not choose PV > 0 projects because old investors get the money
- Cost of confiscation of collateral – homes today fetch ¼ of subprime loan amount when sold, after vandalism etc.
- Restricting leverage can change relative prices, often in ways that improve risk allocation.

What to Do About Leverage Cycle?

- Collect leverage data and make it public.
- Put CDS on exchange.
- Regulate leverage in normal times.
- In the crisis, reverse the three symptoms:
  - Stop foreclosures in order to avoid deadweight losses, and to stabilize uncertainty and margins: write down principal.
  - Releverage the system by going around banks to lend with less collateral
  - Spend govt money to replace natural buyers.

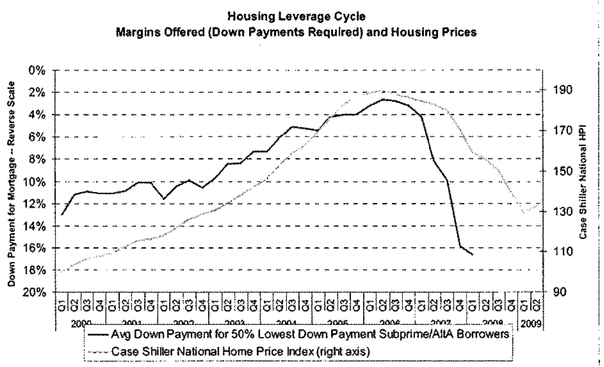

Net Monthly Flow (Excluding Mods) from <60 days to >=60 days DQ
6 Month Average as of Jan 09
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
CCLTV < 60
CCLTV 60-80
CCLTV 80-90
CCLTV 90-100
CCLTV 100-110
CCLTV 110-120
CCLTV 120-140
CCLTV 140-160
CCLTV > 160
06-2 Indices
ABX (Subprime)
Option ARM
Alt-A ARM
Alt-A Fixed
Prime ARM
Prime Fixed

Securities Leverage vs Investor Leverage

- Hard to lie about securities leverage, because another party is reporting
- If some loans long term, investor leverage will often go in wrong direction.
- If investor leverage controls only for big banks, others leverage. Also leverage will move. Securities leverage captures it.
- Harder to put political pressure on regulator who manages security leverage.

end

Look More Closely at Timing



Housing Leverage Cycle

Margins Offered (Down Payments Required) and Housing Prices

Observe that the Down Payment axis has been reversed, because lower down payment requirements are correlated with higher home prices.

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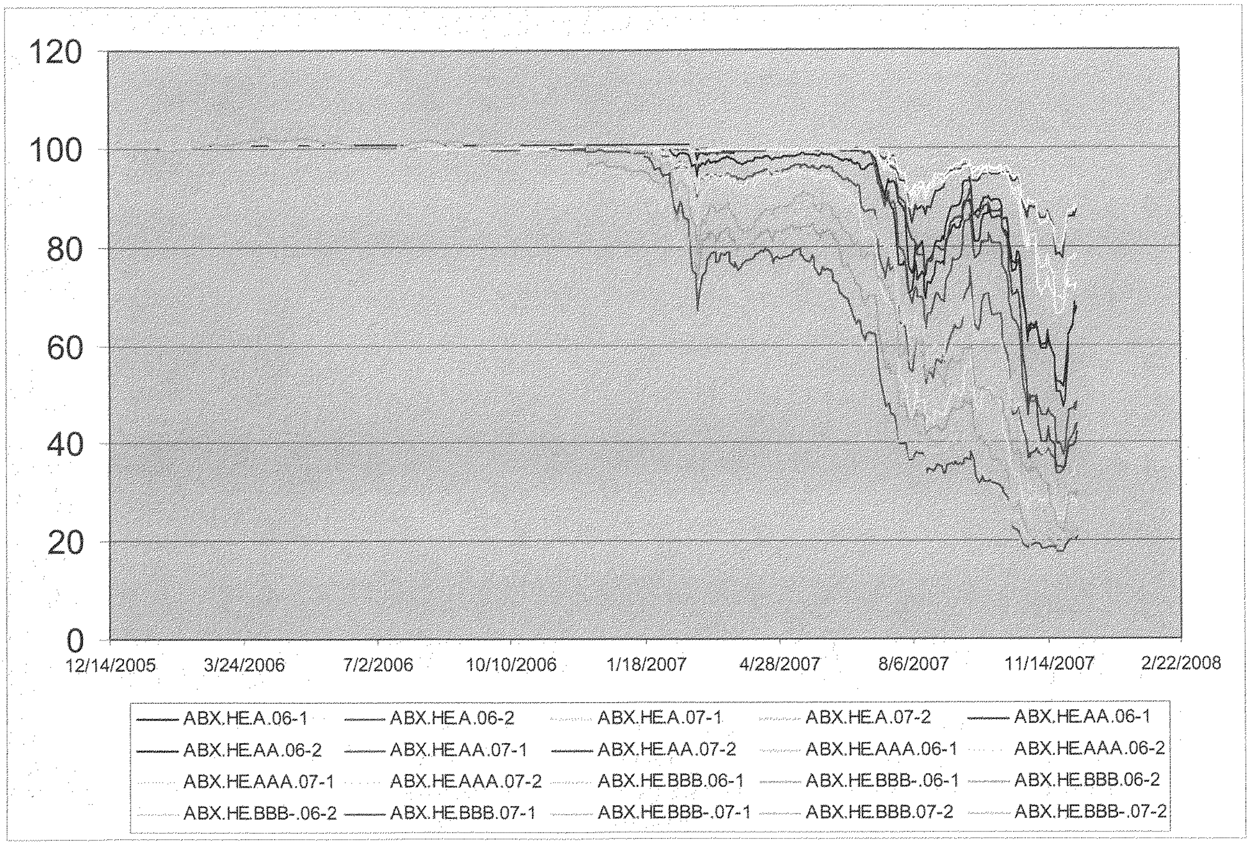
Note Subprime/AltA Issuance Stopped in Q1 2008.

Peak at Q2 2006
Slightly down Q4 2006
CDS created on subprime late 2005
ABX securities index collapses Jan 2007
Double leverage cycle by Q4 2007


120
100
80
60
40
20
0
12/14/2005
3/24/2006
7/2/2006
10/10/2006
1/18/2007
4/28/2007
8/6/2007
11/14/2007
2/22/2008
ABX.HE.A.06-1
ABX.HE.A.06-2
ABX.HE.A.07-1
ABX.HE.A.07-2
ABX.HE.AA.06-1
ABX.HE.AA.06-2
ABX.HE.AA.07-1
ABX.HE.AA.07-2
ABX.HE.AAA.06-1
ABX.HE.AAA.06-2
ABX.HE.AAA.07-1
ABX.HE.AAA.07-2
ABX.HE.BBB.06-1
ABX.HE.BBB-.06-1
ABX.HE.BBB.06-2
ABX.HE.BBB-.06-2
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ABX.HE.BBB-.07-2

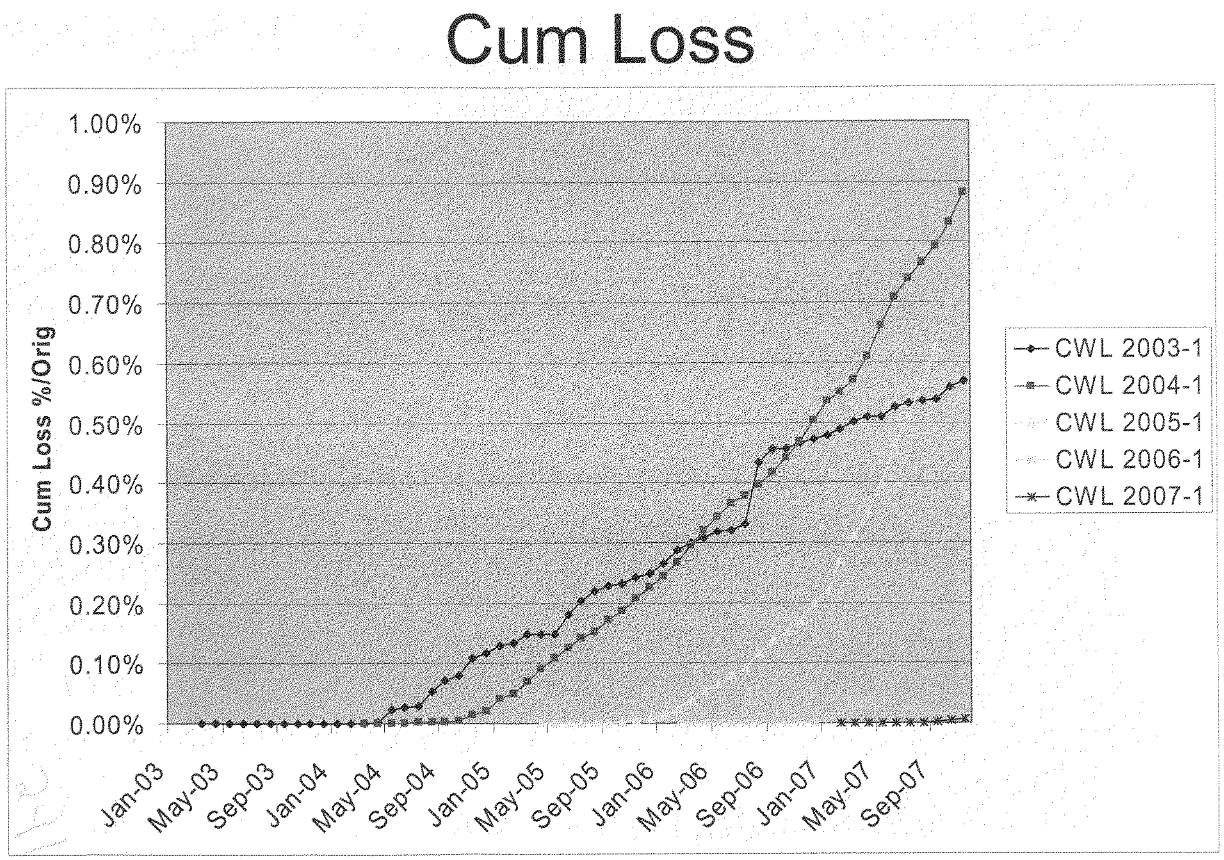

Cum Loss
Cum Loss %/Orig
1.00%
0.90%
0.80%
0.70%
0.60%
0.50%
0.40%
0.30%
0.20%
0.10%
0.00%
Jan-03
May-03
Sep-03
Jan-04
May-04
Sep-04
Jan-05
May-05
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
CWL 2003-1
CWL 2004-1
CWL 2005-1
CWL 2006-1
CWL 2007-1

Chart 3: ABX.HE cumulative loss by reporting month
% of original balance

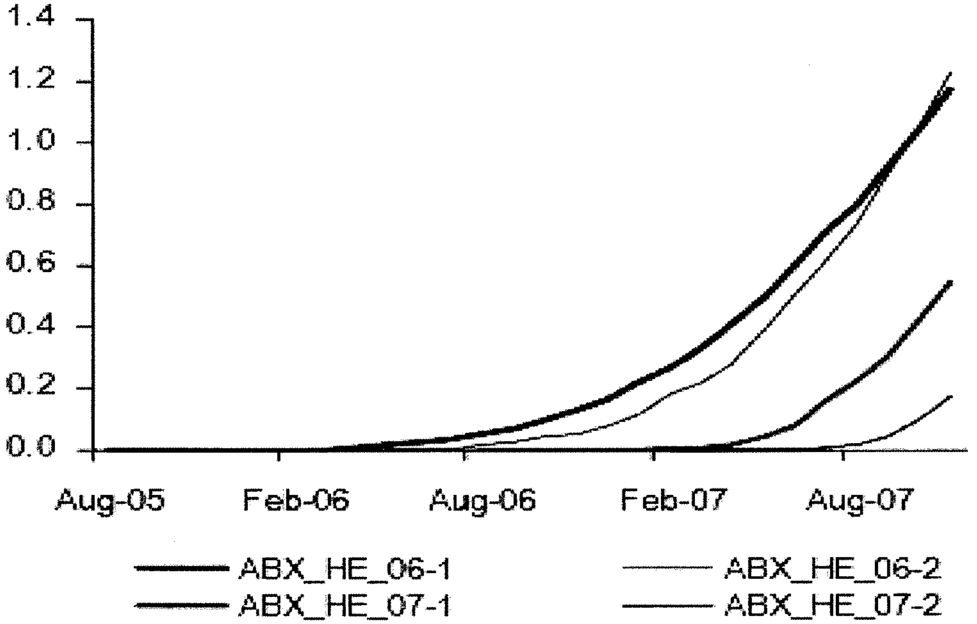
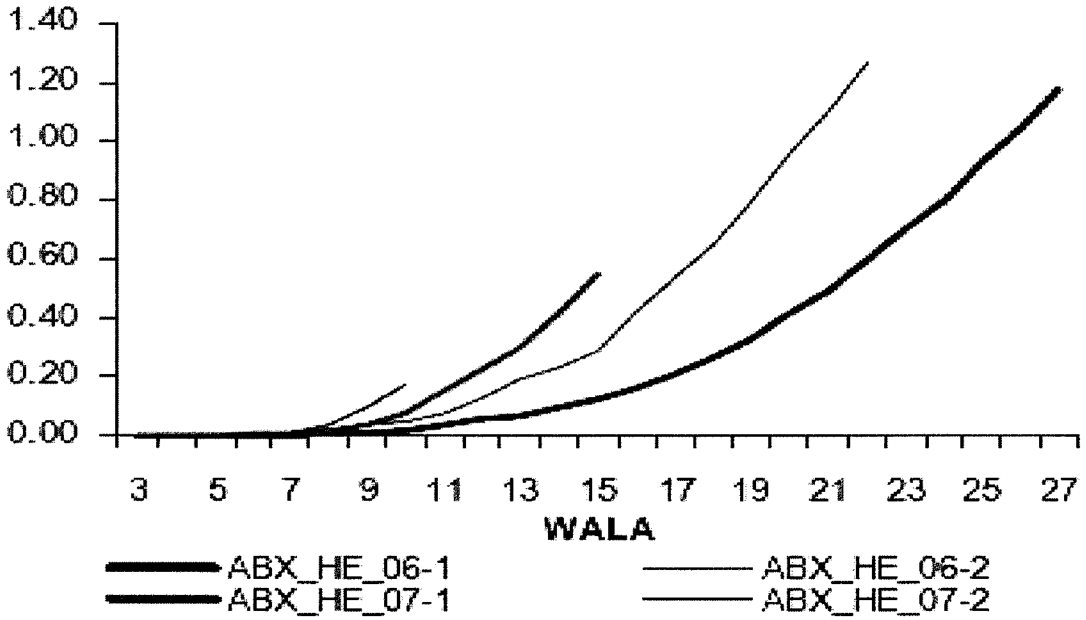


Chart 6: ABX.HE cumulative loss by WALA

% of original balance



DQ / Orig

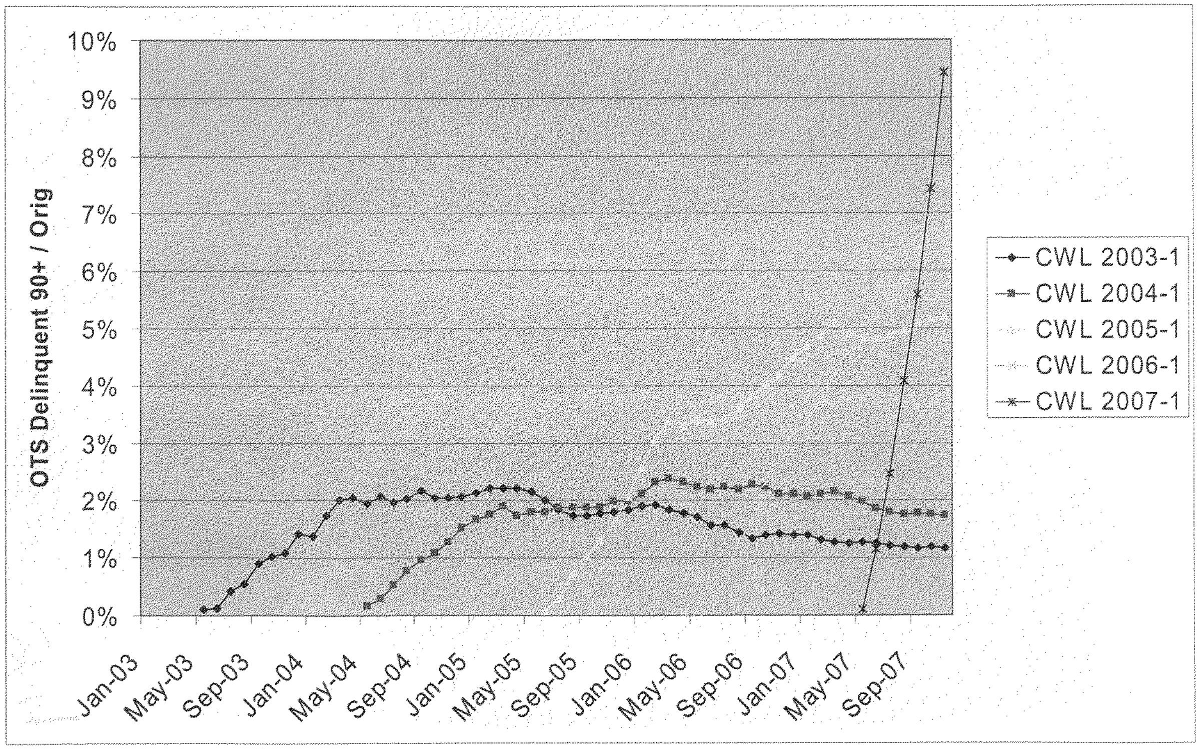

OTS Delinquent 90+ / Orig
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
Jan-03
May-03
Sep-03
Jan-04
May-04
Sep-04
Jan-05
May-05
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
CWL 2003-1
CWL 2004-1
CWL 2005-1
CWL 2006-1
CWL 2007-1

Chart 1: ABX.HE 60+ delinquencies by reporting month
Includes foreclosures and REO (%)

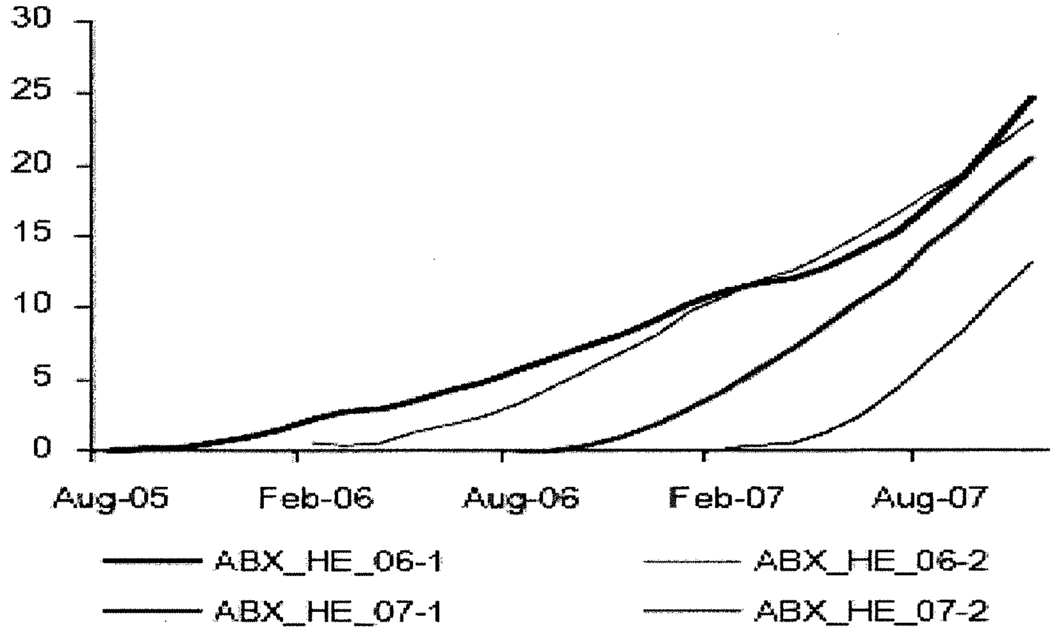
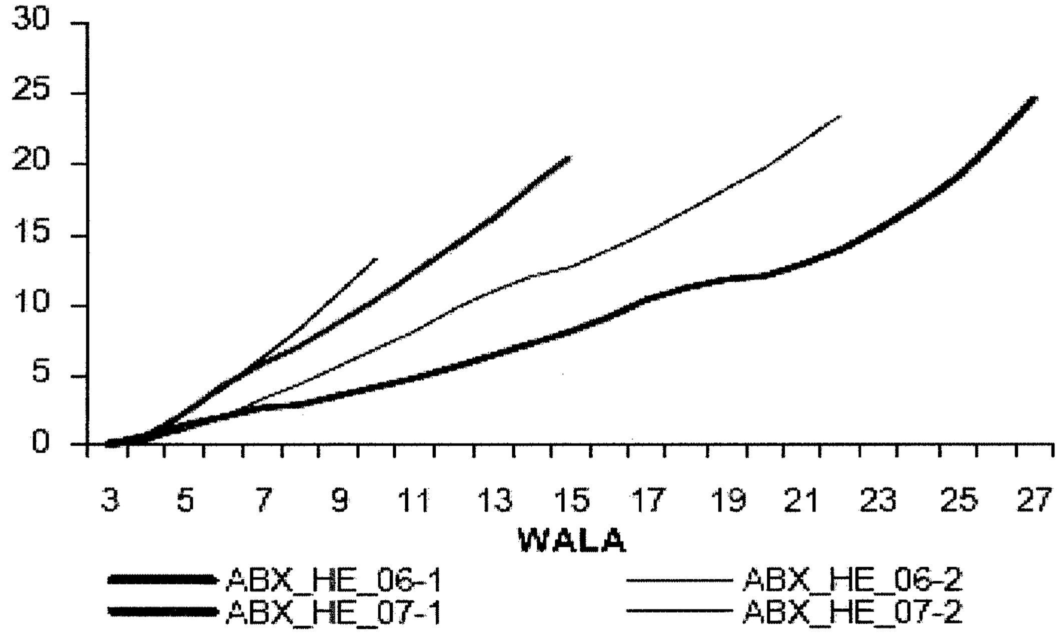


Chart 4: ABX.HE 60+ delinquencies by WALA
Includes foreclosures and REO (% of current balance)



Credit Default Swaps CDS

- Insurance
- Writer of insurance goes long the bond
- Buyer of insurance is shorting bond
- Amounts to leverage
- Short side gets to leverage much more if price is high

Oral Statement of

Thomas M. Hoenig

President

Federal Reserve Bank of Kansas City

before the

House Financial Services Oversight and Investigations Subcommittee

United States House of Representatives

May 6, 2010

Introduction

Chairman Moore, ranking member Biggert, and members of the committee.

Among the factors that contributed to this recent financial crisis, there is no question that leverage was key. And the unwinding of this leverage contributed to the escalation of this crisis into the worst recession in 75 years, hurting Americans at all economic levels.

I have spent more than 36 years at the Federal Reserve deeply involved in bank supervision, and it has been apparent to me for some time that our nation's financial institutions must have firm and easily understood leverage requirements. Leverage tends to rise when the economy is strong as investors and lenders forget past mistakes and believe that prosperity will always continue. If we don't institute rules now to contain leverage, another crisis is inevitable.

My written testimony addresses the systematic increase in debt and leverage that has occurred in all major sectors of our economy over the past two decades. My comments today, however, will focus specifically on what occurred at the largest financial firms—which were the catalysts for this crisis.

Leverage is the ability to use debt to build assets as a multiple of a firm's capital base. The leverage at banking organizations has risen steadily since the mid-1990s, but was not immediately obvious because of the many different ways capital and leverage can be measured. In my judgment, the most fundamental measure of a financial institution's capital is to exclude intangible assets and preferred shares and focus only on tangible common equity—that is ownership capital actually available to absorb losses and meet obligations. Looking at tangible common equity, you see that leverage for the entire banking industry rose from $16 of assets for each dollar of capital in 1993 to $25 for each dollar of capital in 2007. More striking perhaps, this aggregate ratio was driven most significantly by the 10 largest banking companies. At these firms, assets rose from 18 times capital to 34 over the same period, and that does not include their off-balance sheet activities.

These numbers, in my opinion, reflect two essential points. First, that based on capital levels, the 10 largest banking organizations carried fundamentally riskier balance sheets at the start of this crisis than the industry as a whole. Second, their greater leverage reflects a significant funding cost advantage. Not only is debt cheaper than equity, but their debt was cheaper than for smaller organizations because creditors were confident these firms were too big to be allowed to fail.

This was a gross distortion of the marketplace, providing these firms an advantage in making profits, enabling them to build size, and then, in the end, leaving others to suffer the pain of their collapse. This is not capitalism, but exploitation of an unearned advantage. And the list of victims is long, including families who lost homes, workers who lost jobs, and taxpayers who were left to pay the tab.

This increase in leverage in the banking industry spread broadly to the other sectors of the economy, creating a general excess of credit growth over the past 10 years, especially among consumers.

This economy-wide rise in leverage was based on the assumption that asset prices would continue to rise, especially those in housing. When prices fell and defaults and losses mounted, capital ratios that had been systematically reduced over time proved grossly inadequate. To illustrate, suppose the 10 largest banking organizations had been required to confine their leverage to a historically more reasonable level of $15 of tangible assets for every dollar of tangible common equity rather than the $34 they had. Under this historically limit, they would have been forced to hold an additional $326 billion of equity, 125 percent more than they actually had, to absorb potential losses, or they could have cut back on their growth by nearly $5 trillion, or more likely, some combination.

The point is that institutions got away from the fundamental principles of sound management. And those institutions with the highest leverage suffered the most. Financial panic and economic havoc quickly followed. The process of deleveraging is underway, rebuilding capital has begun, but during this rebuilding loans are harder to get, which is impeding the economic recovery.

With this very painful lesson fresh in our minds, now is the time to act.

I strongly support establishing hard leverage rules that are simple, understandable and enforceable and that apply equally to all banking organizations that operate in the United States. As we saw in the years before the crisis, leverage tends to rise during economic expansions as past mistakes are forgotten, and pressure for growth and higher return on equity mounts. Straightforward leverage and underwriting rules require bankers to match increases in assets with increases in capital and prevent disputes with bank examiners over "interpretations" of the rules. As a result, excess is constrained, and a countercyclical force is created that moderates booms and forms a cushion when the next recession occurs.

I firmly believe that had such rules been in place, we would have been spared a good part of the tremendous hardship the American people have gone through during the past two years.

Critics of more conservative capital ratios say this will restrict growth. Yes, it will. The success of the U.S. economy is not the result of the size of financial institutions but the strength of the financial system. I would be pleased to answer your questions.

Leverage: The Double-Edged Sword

Written Statement of

Thomas M. Hoenig

President

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before the

House Financial Services Oversight and Investigations Subcommittee

United States House of Representatives

May 6, 2010

Introduction

Chairman Moore, ranking member Biggert, and members of the committee. Thank you for the opportunity to testify at this timely hearing.

The financial panic of 2008 created the worst recession since the 1930s, sending unemployment soaring to 10 percent and dramatically changing the landscape of our financial system. While many factors were responsible for creating this crisis, there is no doubt that excessive debt and leverage was a major contributor.

Leverage, the ability to use debt to build assets as a multiple of a firm's capital base, is a double-edged sword. Credit is obviously essential to an economy's growth and prosperity. But when a tower of debt is built on a foundation of weak capital, the inevitable outcome is a collapse and loss of national wealth.

Following this most recent crisis, lawmakers and regulators are examining the issues of debt, leverage and financial strength. We are at a crossroads. The country must again review and define an acceptable leverage profile for our economy and specifically for financial institutions. Defining leverage standards too tightly inhibits growth. Defining them too loosely invites excess risk and crisis.

My views on this topic are based on 36 years of broad experience in the Federal Reserve. As head of bank supervision for the Federal Reserve Bank of Kansas City in the 1980s, I saw the damage caused nationally and locally by excessive leverage and bank failures—both small and large. As President of our Bank over the past 18 years, I've witnessed the anguish of individuals and businesses as they struggled to manage the downside effects of too much leverage.

Trends

Over the past two decades there has been a systematic increase in debt and leverage within the United States, involving all major sectors of the economy. The charts I have included with my statement show asset-capital and debt-income ratios increasing annually across all sectors, rising to levels well above long-run trend lines. In hindsight most agree this build up was excessive and the markets and the regulators should have seen the crisis coming. But they didn't.

There are three components that we must look at in judging the safety of any level of leverage: the quality of assets, the quality of capital and the amount of capital. While asset quality is important, it is the quality and amount of capital that gets a company through unexpected asset problems encountered during the course of business. For that reason, I will focus my attention here on the quality and amount of capital.

Stockholder tangible common equity is the strongest form of capital. It is immediately available to meet creditor obligations and absorb losses. Fundamentally, this is what defines a meaningful measure of leverage. Other measures of capital include different hybrid debt instruments or intangibles that attempt to account for potential value and future earnings. For example, goodwill is an intangible that is not immediately available and evaporates quickly when a firm encounters asset problems. Trust preferred stock is a hybrid-debt instrument that carries cash flow demands over the life of the instrument. Thus, I measure leverage as a firm's total tangible assets measured against tangible common equity.

The leverage at banking organizations has been rising steadily since the mid-1990s. The increase, however, is not immediately obvious because of the different ways capital and leverage can be measured (Chart 1). For example, in 2007 just before the crisis began, leverage for all banking organizations based on total equity capital, which includes common equity, perpetual preferred stock, and goodwill and other intangible assets, was the same as it was in 1993, $13 of assets for each dollar of capital.

The story is quite different when you focus on tangible common equity by excluding perpetual preferred stock and goodwill and other intangible assets. Tangible total assets rose from 16 times tangible common equity in 1993 to a multiple of 25 in 2007. The increased reliance on lower quality capital in recent years is clearly seen by the large gap among the various leverage measures in recent years as compared to the early 1990s when all the measures were about the same.

Moreover, a closer examination of the distribution of leverage across firms of different sizes shows that almost all of the increase in leverage is due to the largest banking organizations (Chart 2). For the 10 largest banking companies, leverage based on tangible common equity almost doubled from 18 in 1993 to 34 in 2007, and this doesn't include their off-balance sheet activities. For the rest of the industry, leverage rose from 14 to just 17 (Chart 3). I would also note that for broker-dealers, which are an increasingly important source of credit through the shadow banking system, financial leverage rose from 13 in 1992 to 47 in 2007 (Chart 4).

As a result, with twice as much leverage as all other banking organizations, the 10 largest had much riskier balance sheets at the start of the crisis. The much higher leverage and greater risk exposure of the 10 largest firms clearly indicates that they had a significant funding cost advantage over all other organizations, and their creditors believed they had less exposure to losses.

This increase in financial sector leverage fueled a significant growth of debt in the nonfinancial sector of the economy and, as it turned out, led to a general excess of credit growth over the past 10 years (Chart 5). Bank lending rose from 39 percent of gross domestic product (GDP) in 2004 to 47 percent by the end of 2007, and that figure excludes the rapid growth in credit from the shadow banking sector and the GSEs, Fannie Mae and Freddie Mac. While bank loans relative to GDP have declined since 2008, it remains well above the long-term trend.

The increase in leverage and debt was most prominent in the consumer sector. Consumer debt as a percent of personal income generally has been rising since the 1950s (Chart 6). However, it began a rapid acceleration in 2000, rising from 76 percent to 110 percent by the end of 2007.

Nonfinancial business borrowing relative to nominal GDP also has followed an upward trend since the 1950s (Chart 7). During this most recent expansion, it has increased from 77 percent in 2004 to 89 percent at the end of 2007.

Finally, and no less importantly, the federal government deficit is at record levels and the current trend is unsustainable (Chart 8). The increase over the past two years is due partly to the automatic stabilizers that come in to use during a recession and to additional fiscal actions taken to restart the economy. These temporary actions will add to an already heavy burden of various programs that have sharpened the upward trend with no obvious end in sight.

Effects

Given the levels of leverage in the economy, no one should have been surprised at the collapse triggered by the housing bubble bursting in 2006 and the rise in subprime mortgage defaults in 2007.

When housing prices fell, many discovered that they had taken on more financial risk than they previously assumed and more than their capital levels could support. The institutions with the highest leverage suffered the most, and, as it turned out, these were some of the largest institutions in the world. Financial panic quickly followed.

What started as a Wall Street panic soon created regional distress and finally Main Street suffering. And just like the largest institutions, the regional and community banks that were most leveraged, were most likely to fail. The wave of losses, consumer foreclosures and business failures infected every element of the economy.

The deleveraging process commenced as highly-leveraged financial institutions, working with highly-leveraged consumers and business, had insufficient capital to withstand the financial blows. Increasing numbers of homeowners were unable to keep up with their mortgage payments, leading to higher defaults. Mortgage defaults, in turn, sharply lowered the values of mortgage securities held by financial institutions. These losses led banks to attempt to reduce their leverage, which required rebuilding tangible capital and reducing total assets – thus reducing loans. This placed downward pressure on asset values, losses worsened and the vicious cycle of deleveraging worsened. Homes and businesses were lost to foreclosure and liquidation, while unemployment climbed.

The large increases in leverage over the past decade have wrecked havoc on our economy and are responsible for the sluggishness of our recovery. Strong economic growth simply cannot occur if consumers and businesses must focus on rebuilding balance sheets instead of on increasing spending, production and hiring of new workers

Once again we have learned that the double edged sword of leverage is a pro-cyclical weapon.

Constraining Leverage

Today, the largest financial firms are showing a solid recovery. Regional and community banks continue to show stress but problems may have peaked as they have worked to reestablish stable capital and leverage levels. The market appears to be correcting and leverage based on high quality capital is returning to more historic norms. In time credit will once again expand and the economy will improve. But it won't be quick or easy. Therefore, we must now turn to actions that will prevent the impulses of consumers, businesses, and financial institutions from assuming ever more leverage as the expansion becomes a boom. If we take action now, then when the next economic correction occurs there will be less devastation to our economy. If we don't change policy now, then this crisis will be remembered only in text books and leverage will rise again and lead to another crisis.

I strongly support establishing hard leverage rules that are simple, understandable and enforceable and that apply equally to all banks and bank holding companies that operate in the

United States. As we saw in the years leading up to the current crisis, leverage tends to rise during economic expansions as investors and lenders forget their past mistakes and believe that prosperity will continue with no end in sight. Straightforward leverage and underwriting rules are not procyclical, so that as the economy expands and heats up, bankers must match increases in assets with increases in capital, which constrains reckless growth. Thus, such rules would serve to limit growth beyond a prudent level by creating a counter-cyclical force that moderates booms and provides a cushion to bank losses when the next recession occurs.

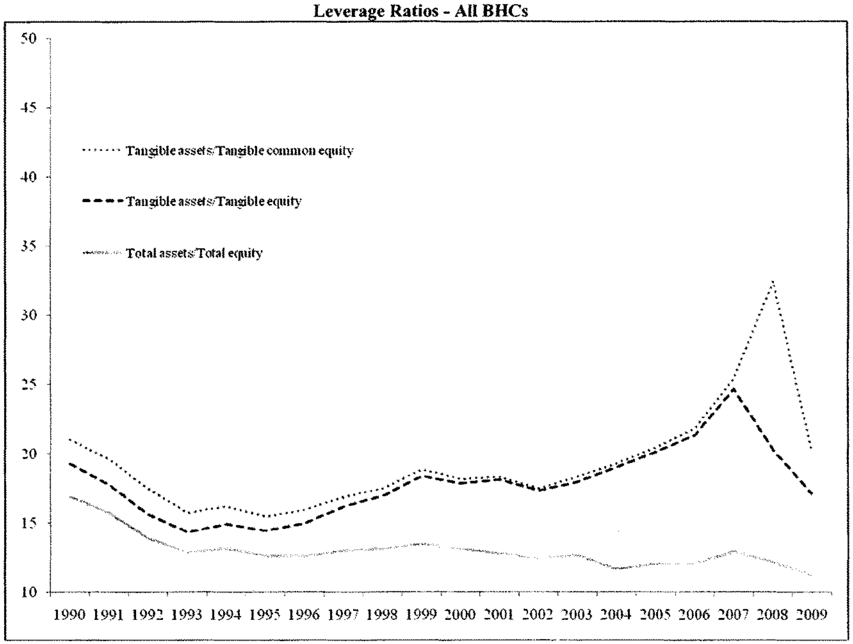
For an example of the power of a hard leverage rule, consider the impact on assets and/or equity of restricting bank holding companies to holding no more than $15 of tangible assets for every $1 of tangible equity capital (Chart 9).As I noted, at the end of 2007, the 10 largest bank holding companies held $34 of tangible assets for every $1 of tangible equity capital. If the maximum leverage ratio was 15:1, these companies would have had to reduce their assets by $4.9 trillion (56 percent), increase their tangible common equity by $326 billion (125 percent), or some combination of the two.

Simple rules also provide examiners with the tools they need to prevent leverage from rising and underwriting standards from declining. Without hard rules on leverage ratios and lending standards, bank examiners were disadvantaged in taking actions on rising leverage and declining loan-to-value ratios because bankers could correctly claim they were following supervisory guidance on capital levels, and their loan problems were very low, while profits were strong.

Finally, the rise in leverage in the last cycle was facilitated by the complexity of international risk-based-capital requirements. In particular, the Basel I risk-based capital standards in place leading up to the crisis provided very crude measures of asset riskiness, which increasingly underestimated risk as asset markets deteriorated. Banks also could arbitrage capital standards and raise their risk-based capital ratios by shifting assets to favorably treated off-balance sheet vehicles or exchanging assets such as prime mortgages for "lower risk" subprime mortgage-backed securities. The Basel II risk-based standards, which we were starting to phase in, would have enabled an even greater amount of leveraging to occur. These standards, which allow banks to use model-based risk estimates for many types of assets, actually suggested banks were holding too much capital in the months leading up to the crisis.

Chart 1

Leverage Ratios - All BHCs

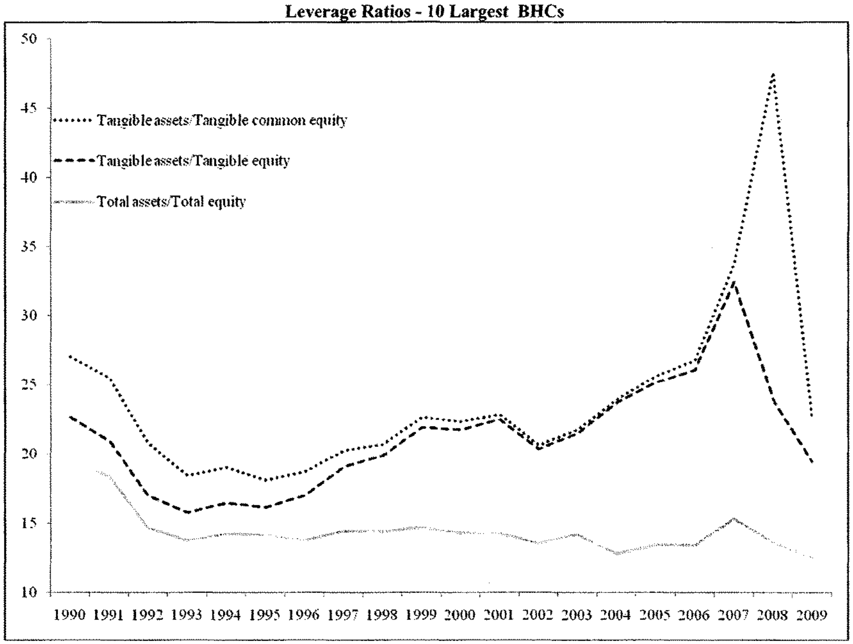


Source: FR Y9-C, End of Year

Note: Tangible assets/tangible common equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less perpetual preferred stock, goodwill and other intangible assets. Tangible assets/tangible equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less goodwill and other intangible assets. Total assets/Total equity capital is calculated as total assets divided by total equity capital.

Chart 2

Leverage Ratios - 10 Largest BHCs

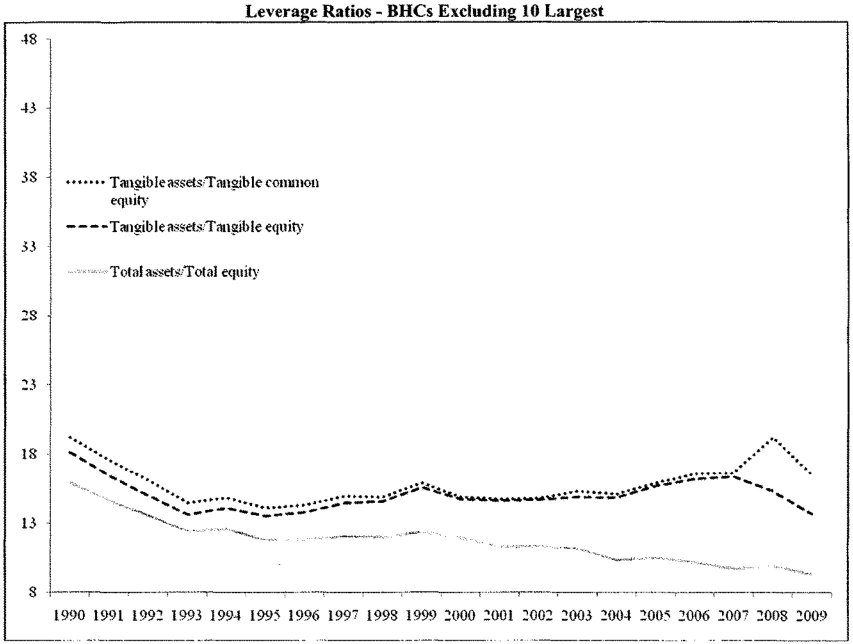


Source: FR Y9-C, End of Year

Note: Tangible assets/tangible common equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less perpetual preferred stock, goodwill and other intangible assets. Tangible assets/tangible equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less goodwill and other intangible assets. Total assets/Total equity capital is calculated as total assets divided by total equity capital.

Chart 3

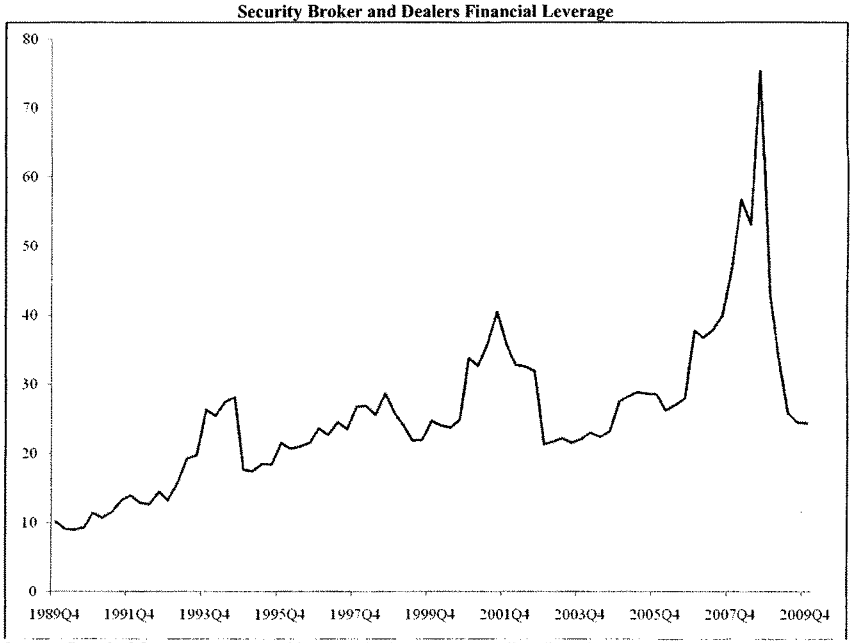
Leverage Ratios - BHCs Excluding 10 Largest



Source: FR Y9-C, End of Year

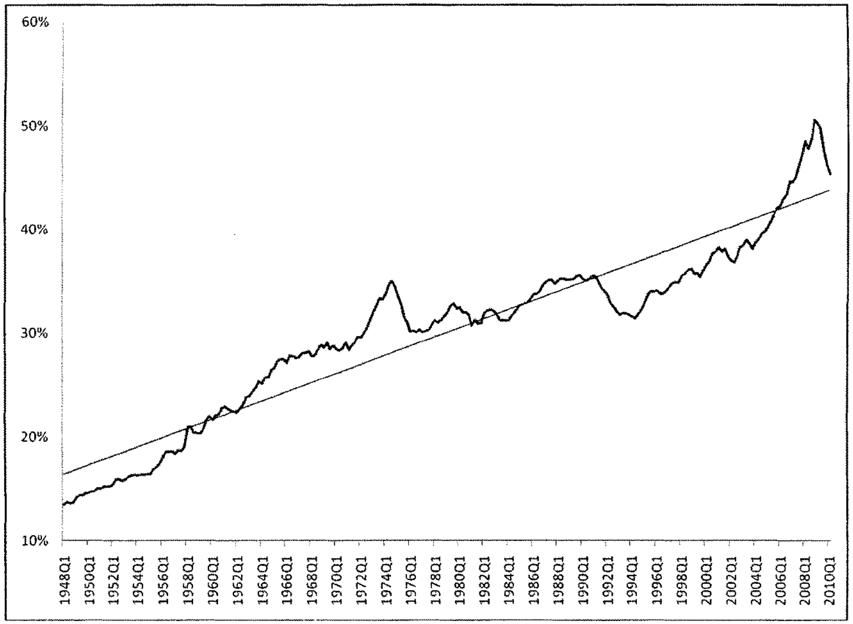
Note: Tangible assets/tangible common equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less perpetual preferred stock, goodwill and other intangible assets. Tangible assets/tangible equity is calculated as total assets less goodwill and other intangible assets divided by equity capital less goodwill and other intangible assets. Total assets/Total equity capital is calculated as total assets divided by total equity capital.

Chart 4
Security Broker and Dealers Financial Leverage



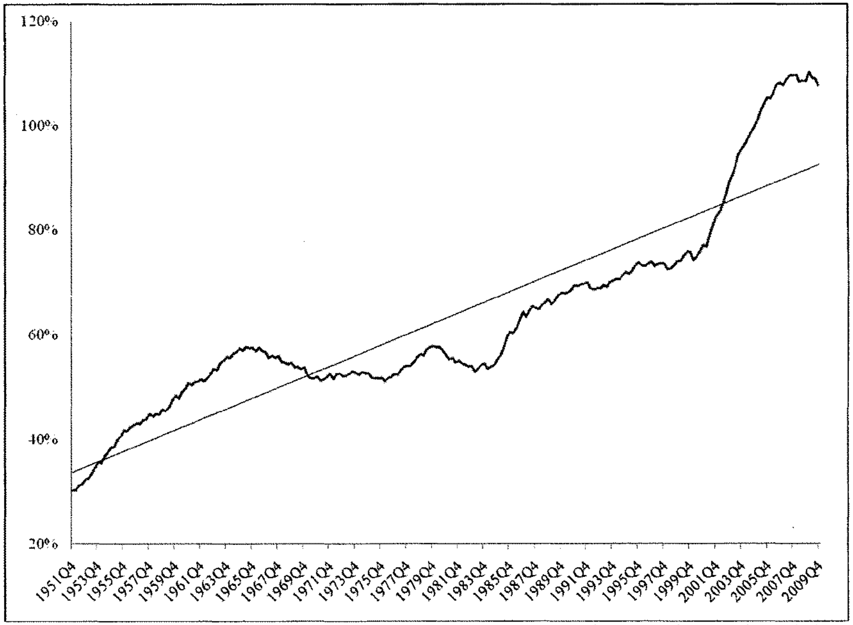
Source: Board of Governors Z.1 – L.129, quarterly data, not seasonally adjusted.
Note: Financial leverage is financial assets divided by the difference between financial assets and liabilities.

Chart 5
Bank Loans relative to GDP



Source: Board of Governors, H.8, quarterly data, seasonally adjusted; Bureau of Economic Analysis, NIPA Table 1.1.5., quarterly data, seasonally adjusted.
Note: Bank loans relative to GDP is calculated as loans and leases of all U.S. commercial banks divided by nominal GDP.

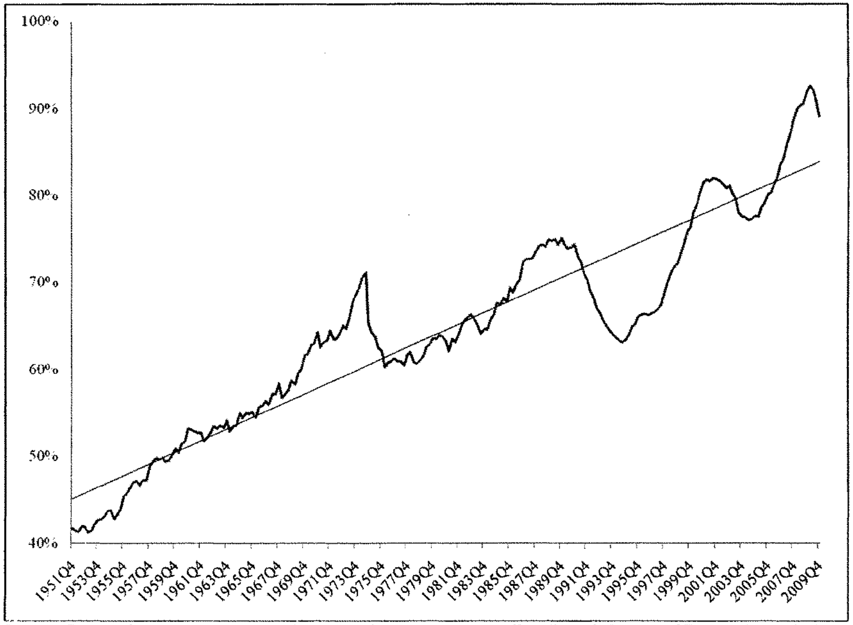
Chart 6
Consumer Debt Burden



Source: Board of Governors, Z.1 – L.100, quarterly data, not seasonally adjusted; Bureau of Economic Analysis, NIPA Table 2.1., quarterly data, seasonally adjusted.
Note: Consumer debt burden is consumer liabilities divided by nominal personal income. The consumer liabilities are calculated as credit market instruments less municipal securities and commercial mortgages.

Chart 7

Nonfinancial Business Debt Burden

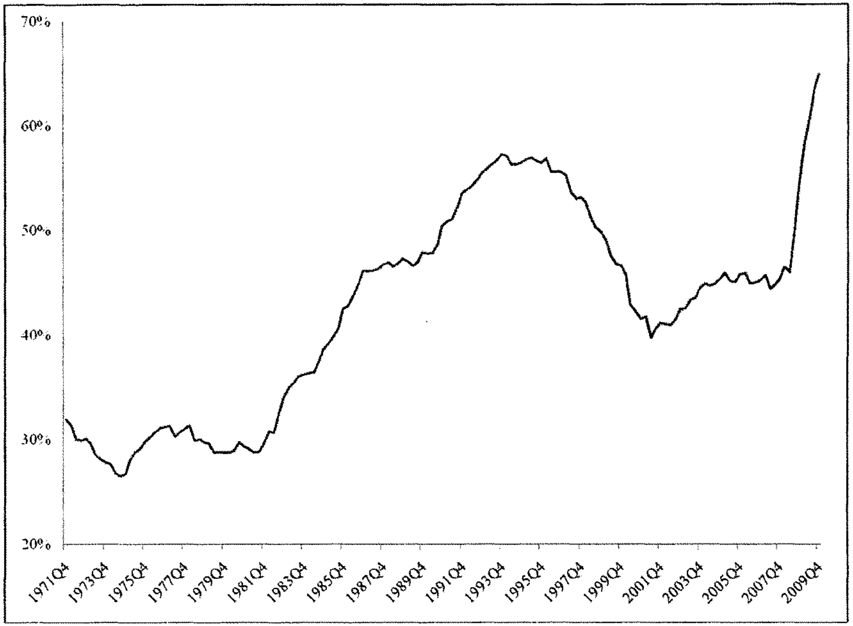


Source: Board of Governors, Z.1 – L.101, quarterly data, not seasonally adjusted; Bureau of Economic Analysis, NIPA Table 1.1.5., quarterly data, seasonally adjusted.

Note: Nonfinancial business debt burden is nonfinancial business liabilities divided by nominal GDP. The nonfinancial business liabilities are calculated as trade payables and credit market instruments less municipal securities.

Chart 8

Federal Government Debt Burden

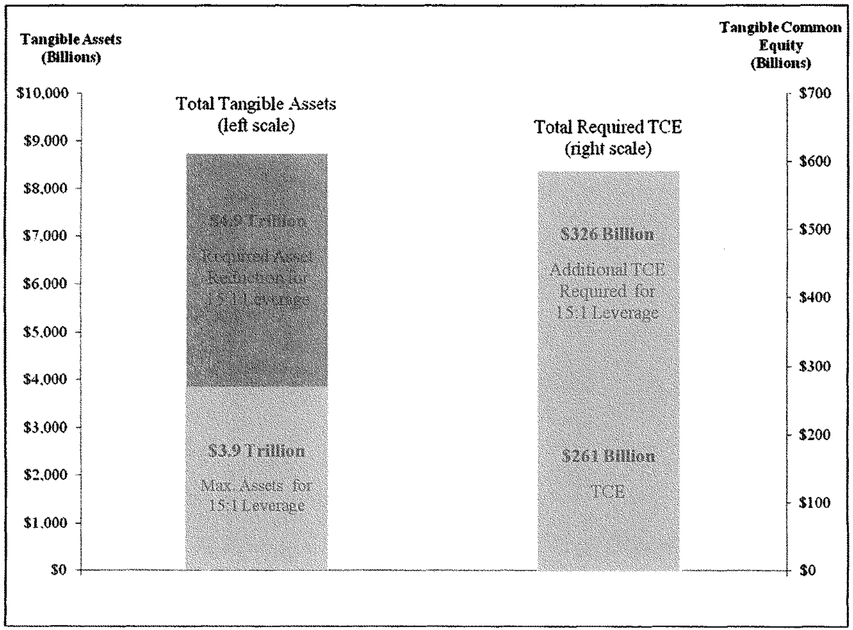


Source: Board of Governors, Z.1 – L.106, quarterly data, not seasonally adjusted; Bureau of Economic Analysis, NIPA Table 1.1.5., quarterly data, seasonally adjusted.

Note: Federal government debt burden is federal government liabilities divided by nominal GDP. The Federal government liabilities are calculated as credit market instruments, trade payables, insurance reserves, and miscellaneous liabilities.

Chart 9

Top 10 BHC's – Reduction in Assets or Additional Tangible Common Equity to Achieve 15:1 Leverage Ratio



Source: FR Y9-C, December 2007

Note: Tangible assets is total assets less goodwill and other intangible assets. Tangible common equity (TCE) is total equity capital less perpetual preferred stock, goodwill and other intangible assets.

THE END OF EXCESS (PART I)

Testimony
in the front of the
House Financial Services Oversight
and
Investigations Subcommittee

May 6, 2010

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GREETING

Chairman Moore, Ranking Member Biggert, and Committee Members, thank you for the opportunity to testify in front of the House Financial Services Oversight and Investigations Subcommittee on Addiction to Debt and Leverage. I am David A. Walker, the John A. Largay Professor in the McDonough School of Business at Georgetown University. I represent only myself. My summary bio is attached to my written testimony as an appendix. You surely should not be subjected to my full academic resume.

CONCLUSIONS

I would like to urge the Committee to enhance competition among financial markets and institutions. Large firms that are managing their risk effectively are not necessarily too big, and our economy needs their services. It is the mismanaged firms that needed greater regulation – and some of them created the financial crisis and have already failed.

Abuses included institutions taking unreasonable risks in investing and lending, rating agencies not being sufficiently independent, consumers borrowing more than they could possibly repay, lenders making "NO DOC" loans, and government spending at levels that increased the fiscal deficit to 11 percent of GDP. There is blame for the financial crisis for every segment and almost every participant in the U.S. economy.

Three definitive recommendations I would like to offer the Committee are: the Office of Thrift Supervision be merged into the Office of the Comptroller of the Currency as soon as possible; small, insured depository institutions not be subjected to additional capital restrictions; and the FDIC be assigned the responsibility for consumer financial protection without creating a new agency and an additional bureaucracy.

INTRODUCTION

Background

I have developed my testimony in four segments: consumer debt; financial institutions leverage; corporate debt, and public debt. I will address several issues concerning financial reform where I hope to contribute some innovative ideas.

Assistance

I would like to acknowledge the assistance I have received with this testimony from several people. They are: my friend and co-author Dr. Thomas Durkin, formerly senior economist with the Board of Governors of the Federal Reserve; my son, Dr. Matthew Thayer Billett, the Henry B. Tippie Research Fellow and tenured full professor in the Tippie College of Business at the University of Iowa; my Georgetown research colleague Professor Keith Ord, and three premier Georgetown undergraduate students – Reilly Davis, Max Gaby, and Christina Hunt. These students are co-authors with me on scholarly research with me, and they are here today.

CONSUMER DEBT

Consumer Credit

For the record, I am submitting a copy of a forthcoming, peer reviewed study on "Long Run Credit Growth in the U.S.," which I have co-authored with Dr. Durkin and Professor Ord. The issue we analyzed was how levels of consumer and mortgage credit and debt have changed over the past 60 years. The media regularly proclaims that consumer debt is out of control. One expression of concern was in the series entitled "The Debt Trap," published in the *New York Times* from August 2008 to January of 2009.

There is a long term trend toward higher nominal debt levels. Borrowing by households grew sharply in the cyclical expansions of the past few decades. Total non mortgage consumer credit outstanding increased more than ten fold over the period 1975-2006 and approximately tripled in real terms.

Dr. Durkin, Professor Ord and I have shown that aggregate *real* consumer credit, *adjusted* for price changes and *excluding* mortgage credit, has increased at virtually the same annual rate as *real* U.S. disposable income over the past 60 years. When adjustments are included for changes in consumer prices, the percentage change in consumer credit outstanding virtually equals the percentage change in real disposable income (0.97). This includes consideration for unemployment and long-term interest rates. This result is consistent with 1957 estimates offered by Alain Enthoven, whom some of us remember as one of the McNamara Pentagon whiz kids in the early1960s.

Mortgage Credit.

These conclusions with regard to consumer credit are very different from the experience with mortgage credit. Many consumers levered their housing purchases by accepting mortgage credit far beyond their ability to repay. Mortgage lenders often made "NO DOC" loans, requesting almost no documentation to measure borrowers' ability to pay their obligations. There have been reports that the mortgage interest would be approximately 50 percent of a borrower's income, and the same borrowers had substantial other credit obligations.

Much of the recent consumer credit crunch has been caused by what I consider to be irresponsible mortgage lending and the unreasonable assumption that there would be no finite limit to which housing prices would rise. Perhaps, the best treatise on the subject was written by the late Federal Reserve Governor Edward M. Gramlich, Subprime Mortgages: America's Latest Boom and Bust, published by The Urban Institute. Governor Gramlich warned about the danger of subprime lending for approximately five years before other public policy makers took the issue seriously.

Some people have incorrectly blamed adjustable rate mortgages for the mortgage credit crisis. Adjustable rate mortgages allowed many legitimate borrowers to purchase a home they might otherwise not have been able to purchase. The problem was the high reset rate, often well above market rates, when the reset was required on subprime loans and the borrower had no equity in the property and no alternative, except to accept a high reset rate or default.

I believe one of the greatest problems in the housing crisis was the "supervision" by the Office of Thrift Supervision. The failures of IndyMac and Washington Mutual were failures by institutions supervised by the OTS, and some have argued that if these thrift holding companies had been supervised by the Fed instead of the OTS, the results could have been somewhat different. This would be just one more of many examples where the independence of the Federal Reserve is *essential.*

Some stipulations of the deregulation legislation in 1980 gave savings and loans new powers to make short term consumer and commercial loans and to adjust the interest rates on mortgages to market rates. The risk profiles in the next section suggest that these changes, three decades ago, did not solve many of their difficulties.

I am a strong proponent of merging the OTS into the Office of the Comptroller of the Currency, and I would urge this Committee and the Congress to pass a separate bill to accomplish this long before you complete the complex regulatory reform legislation. The recent experiences with IndyMac and Washington Mutual seem, to me, to suggest that in its current form, the OTS has many of the same problems that the Federal Home Loan Bank Board had as a thrift regulator.

FINANCIAL INSTITUTIONS' LEVERAGE

The Financial Crisis and TARP

The financial crisis introduced the American public to the activities of many uninsured financial institutions that operated with much greater risk than was realized. The insured depository institutions are, in many ways, very different, from the investment banks and insurance firms. To save the U.S. financial system, it was deemed essential by most experts that the Congress and the Treasury needed to provide temporary support, while the risks and often unsavory behavior was analyzed.

I believe that the TARP commitment was essential. Philosophically, many are hesitant to bail out any financial institution or any firm that is in jeopardy, and I generally agree with that view. Going forward, I argue that no firm, nor any institution should expand to the extent that it would be Too Big To Fail. The goal should be for financial regulators to be empowered and prepared to deal with large institutions that have financial difficulties before their difficulties suggest that they might fail.

Mark Flannery (2010) has proposed a system that would require large banks to hold debt instruments in the form of Contingent Capital Certificates that would automatically convert to bank equity, if the market value of a large bank's equity fell below an established threshold. This would eliminate regulatory delays and negotiations when a bank might be in jeopardy. Establishing the threshold as a function of the market value of a bank's equity would provide a daily valuation about whether the debt Certificates would need to be converted to capital.

Max Gaby and I have a paper on "Impacts of TARP on Financial Institutions" that I would like to include in the record for these hearings. We believe that insolvency for any of the four largest U.S. commercial banks during the financial crisis could have virtually destroyed the U.S. financial system and would have had serious detrimental effects on global financial markets. These four banks dominate much of the U.S. banking system as sources of short-term capital and represent almost 40 percent of American total bank assets. Max and I completed bank stress tests using publicly available data to show the vulnerability of the four largest banks. Our results were consistent with the confidential Federal Reserve Supervisory Capital Assessment Program.

It is surely true that some of the TARP funds will never be repaid, but I believe the cost, compared to the potential cost of a single failure of a very large bank, had to be accepted. It was a short-term, not a long-term solution. It is my opinion that our economy would be rebounding much more slowly than it has if we had not implemented the TARP program. We should not forget that the Dow Jones Industrial Average has rebounded from 7,609 to approximately 11,000 in the 13 months since March 31, 2009

Financial Institutions' Debt, Equity, and Risk

The debt and leverage experiences of our insured depository institutions can be examined via simple risk ratios. Table 1 provides three ratios that reflect various aspects of financial risk for commercial banks and savings and loans, separated into two size categories for institutions with assets above and below $1 billion. The 29 quarterly observations from December 2002 through December 2009 are readily available from the FDIC web site (www.fdic.gov).

The first four columns in Table 1 provide the means, standard deviations (S.D.) and the ratio of the mean to the standard deviation for each group of institutions. (With an adjustment for the number of observations, which would reduce the S.D., the third number would become a t-statistic). When comparing the ratios for two groups of institutions, if the mean for the first group (Y) is larger than the mean for the second group(X), the first group is deemed to be more risky [(Y-X) > 0].

The first ratio measures the proportion of Tier 1 Capital that supports their nondepoit liabilities. These liabilities are portions of an institution's obligations that could most easily create serious risk. Insured deposits are not risk free, and they do represent a moral hazard to the financial system, but competitive markets, along with FDIC insurance, pretty well determine the pricing and values of these liabilities.

The calculations for risk ratio 1, [(Liabilities – Deposits)/Tier 1 Capital], show:

large banks and large S&Ls are similar (column 5);
small S&Ls are more risky than small banks (column 6);
large banks are more risky than small banks (column 7);
large S&Ls are more risky than small S&Ls (column 8).

Large banks and S&Ls are the ones that require the greatest risk monitoring.

The second ratio shows that only the large banks have a sufficient amount of derivatives to warrant serious concern. Thus, regulations that are deemed necessary for derivative products for insured depository institutions do not need to apply to many institutions.

The third ratio is the primary consideration in the Basel Capital Standards. In each case, the mean Tier 1 Capital Ratio of Risk Weighted Assets exceeds the standard deviation. By size, large banks hold less Tier 1 Capital than S&Ls (columns 5 and 6) and small institutions hold more Tier 1 Capital than large institutions (columns 7 and 8).

Regulatory Action

I would like to offer the Committee and your colleagues' my experience at the FDIC years ago, when the Department of Energy was established. I would urge you NOT to create a new government agency for consumer financial protection. Please consider placing the responsibility with the FDIC. As an independent agency, with separate budget authority, many necessary consumer protection systems already in place, and an existing consumer affairs department, the FDIC is ideally suited to implement the consumer financial protection that the Congress deems necessary.

Another government bureaucracy is not what consumers need. When the Department of Energy was formed, employees who already had government status, and could be transferred, were offered financial incentives to move the Energy Department. The incentives were perverse because employees who accepted offers were often people who were not well regarded in their current agencies and had few prospects for promotions or greater responsibility.

Balancing Demands

Depository institutions have faced a confusing environment during the financial crisis. They have been urged to reduce their risk and prepare for large loan losses. In response, the institutions reduced lending until very recently. However, they have been urged to lend or to be cooperative with borrowers in financial difficulty to support the economic recovery, while they have been admonished to control, or even to reduce, their risks.

CORPORATE DEBT

For 2000-2009, private sector debt and leverage, increased for large and small firms. The Federal Reserve Flow of Funds Data provide total corporate debt, separated by long-term and short-term liabilities by organizational form -- nonfarm nonfinancial corporations (Z1, B102) and nonfarm noncorporate business (Z1, B103).

Table 2, for the decade, the ratio of total debt to assets for large and small firms averaged 49.0 and 43.5 percent, respectively, across the 40 quarters. These percentages reflect substantial differences by firm size in ability to attract debt. When total debt as a ratio to assets is separated by short and long term commitments, small firms depended on short term debt to a much greater degree (28.0 versus 16.5 percent) and corporations had more long term debt (32.5 versus 15.4 percent).

TABLE 1. RISK RATIOS FOR INSURED DEPOSITORY INSTITUTIONS

Ratio 1: (Liabilities - Deposits) / Tier 1 Capital

	1	2	3	4	5	6	7	8
	Large Banks	**Small Banks**	**Large S&Ls**	**Small S&Ls**	**Large Banks - Large S&Ls**	**Small Banks - Small S&Ls**	**Large Banks - Small Banks**	**Large S&Ls - Small S&Ls**
Mean	3.59	0.85	3.52	1.25	0.07	-0.40	2.74	2.27
S.D.	0.38	0.06	0.54	0.07	0.42	0.03	0.35	0.50
Mean / S.D.	9.50	14.63	6.46	18.00	0.17	-13.43	7.78	4.53

Ratio 2: (Notional Value of Derivatives) / Tier 1 Capital

	1	2	3	4	5	6	7	8
	Large Banks	**Small Banks**	**Large S&Ls**	**Small S&Ls**	**Large Banks - Large S&Ls**	**Small Banks - Small S&Ls**	**Large Banks - Small Banks**	**Large S&Ls - Small S&Ls**
Mean	201.78	0.11	0.13	0.03	201.65	0.08	201.67	0.10
S.D.	44.22	0.04	0.07	0.02	44.25	0.03	44.19	0.07
Mean / S.D.	4.56	2.78	1.87	2.04	4.56	2.55	4.56	1.43

Ratio 3: Tier 1 Capital / Total Risk Weighted Assets

	1	2	3	4	5	6	7	8
	Large Banks	**Small Banks**	**Large S&Ls**	**Small S&Ls**	**Large Banks - Large S&Ls**	**Small Banks - Small S&Ls**	**Large Banks - Small Banks**	**Large S&Ls - Small S&Ls**
Mean	9.56	13.37	14.13	17.20	-4.57	-3.83	-3.81	-3.07
S.D.	0.53	0.26	1.36	0.52	1.47	0.29	0.66	1.29
Mean / S.D.	18.08	51.31	10.37	33.36	-3.10	-13.39	-5.77	-2.37

Large banks and S&Ls have total assets over $1 billion. Small banks and S&Ls have total assets under $1 billion. Columns 5-8 are differences.

TABLE 2. BUSINESS DEBT RATIOS

	Total debt/assets	long term debt/assets	short term debt/assets
Corporations	49.0%	32.5%	16.5%
Small firms	43.5%	15.5%	28.0%

The debt/asset ratio increased for small firms over the decade. Corporate debt levels peaked in 2002 and declined through most of the rest of the decade until the recession began at the end of 2007.

The inverse of these debt ratios is the ratio of equity to total assets. Through the decade, small firms' equity ratios decreased, while large corporations' equity ratios increased until the 2007 recession, when their equity ratios declined.

Through the decade, small firms' riskiness increased. This is particularly important for these firms because they have very limited access to capital markets. This is the experience that has been exhibited by many bankruptcies of small firms during the current recession. Moreover, as unemployment increased, debt ratios (total, short-term, and long-term) increased and equity ratios declined.

When estimating the slope coefficients (b and c) for

$$DEBT/ASSETS = a + b\,U + c\,REC$$

U represents unemployment and REC indicates whether or not it was a recession quarter. The coefficient of unemployment, b, is positive, and highly significant for large and small firms with long term as well as short term debt. The recession coefficient, c, is significant for short-term debt levels for corporations as well as small firms. Small firms increased their long term debt (often mortgage debt), when their equity declined, during recessions. Many small firms virtually exist on an entrepreneur's borrowing on their primary residences via first mortgages and home equity loans.

The sensitivity of the debt ratios to unemployment is much greater for small than large business. The differential is at least 20 percent for every tabulation.

These results indicate that the riskiness for small firms has increased, and equity declined, during the past decade. This has serious consequences since small businesses employ 51 percent of the U.S. domestic work force and produce the same percentage of the non farm private gross product according to the U. S. Small Business Administration. Moreover, in the past 15 years, 64 percent of new American jobs were created by small firms (Gramigna, 2009, page 9).

US PUBLIC DEBT

Fiscal Deficits

The U.S. aggregate fiscal debt has increased dramatically since World War II under both Republican and Democratic administrations. When it is committing financial support to a country, the IMF usually establishes a five percent country target maximum fiscal deficit – GDP ratio before funds can be released.

The European Union requires its members to maintain fiscal deficits below three percent of GDP. These targets have been difficult to achieve during the current global financial crisis. For 2010, fiscal deficits as a percentage of GDP are projected to be 11.1 for the U.S., with similar ratios for much of industrialized Europe. The ratios are about half this size for most emerging market countries with limited capital markets. (The Economist, May 1, 2010, page 98).

The graph below shows the percentages by which U.S. fiscal deficits have differed from three percent as a ratio to GDP (FDY3PER) since 1997.

A corollary to constraining a country's fiscal deficit limits aggregate debt (cumulative deficits). Annual debt service is a major annual fiscal expense for a country with a high debt level, even if one year's fiscal budget were balanced. The European Central Bank has adopted a country debt target of 60 percent of GDP, in addition to a maximum annual fiscal deficit ratio of three percent.

U.S. federal government spending has already increased the 2010 fiscal deficit to approximately 1.2 trillion dollars to an aggregate debt level, expected to exceed $14 trillion (approximately equal to GDP). At an average long run interest rate of 5 percent, the $700 billion annual cost of financing this debt would exceed 60 percent of all U.S. federal annual individual plus corporate income tax receipts.

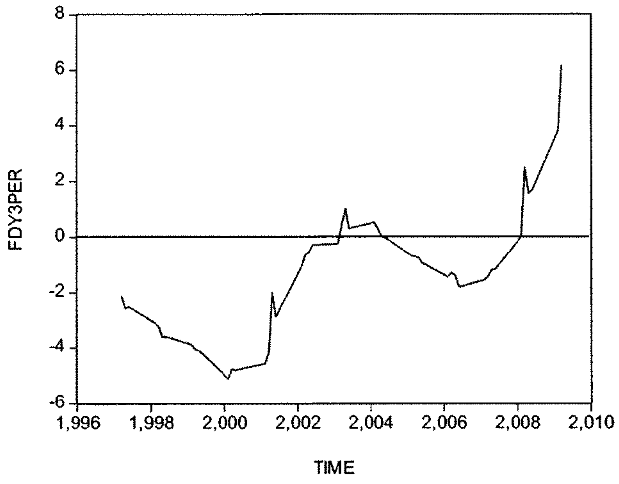
Some economists favor allocating the TARP repayments to other public sector programs to try to reduce unemployment, rather than paying off the additional debt incurred to fund TARP. This could be inflationary. Your Committee surely knows the opinions of budget director Peter Orszag whose policy studies with William Gale (Gale and Orszag, 2002 and 2005) argue that larger fiscal deficits lead to rising long-term interest rates, which agree with a multitude of other studies.

Policy Models

In the mid 1950s, Professor A. W. Phillips developed a theoretical model to test how fiscal deficits (FD) would fluctuate with differences in actual and full employment output (GDP actual – GDP full). I have applied this model to a number of different cases. For the US, since 1997, the fiscal deficit has varied inversely with the difference between actual and full employment output. When actual GDP was below full employment GDP, there have been larger fiscal deficits, which stimulate the economy and move aggregate output towards full employment output. When actual GDP exceeded full employment GDP, fiscal deficits were reduced, probably as a result of larger tax receipts. This is part of a research project that is in progress.

We need to reduce U.S.deficits, or it is highly likely that we will have serious inflation. There are areas where spending can be reduced and some tax deductions may warrant reduction or elimination. I urge the Subcommittee to do everything possible to avoid any burdensome regressive taxes, like a flat tax, to deal with the U.S. fiscal deficit.

FIGURE 1. U.S. FISCAL DEFICIT MINUS 3 PERCENT



THANK YOU

Thank you for this opportunity to meet and speak with you. I would be pleased to attempt to answer any of your questions and to provide further information to the Committee. As my students can tell you, I am a strong believer in answering "I don't know" to at least some of the complex economic questions we are facing in our current volatile, uncertain economic environment.

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APPENDIX

David A. Walker

Background

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Background

Dr. David A. Walker is the John A. Largay Professor and director emeritus of the Capital Markets Research Center, which he directed for 17 years at Georgetown University. He was recently elected to membership in the Cosmos Club. The Israel Council on Higher Education selected him as a member of their business school quality assessment team for the Israel Council on Higher Education. Dr. Walker is currently a board member for the George Town Club and the Georgetown University Student Credit Union. He chaired the Governing Board for the Credit Research Center for eight years. His biography appears in recent and many previous editions of *Who's Who in America, Who's Who in the East,* and *Who's Who in Finance and Industry.*

Dr. Walker served two terms as chair of the Board of Trustees and is past president of Financial Management Association International, representing 4700 academics and practitioners. He has served as Executive Editor of the *Journal of Financial Research*, Co-editor of the *Journal of Small Business Finance*, and an editorial board member for seven finance journals.

Dr. Walker joined the Georgetown faculty in 1980, after serving as Director of Research for the Office of the Comptroller of the Currency and Financial Economist for the Federal Deposit Insurance Corporation. He served as Associate Dean for the Georgetown Graduate MBA and MS Tax Programs during their initial accreditation, and he has chaired many search committees and academic committees during his 28 years at Georgetown. Previously he taught at Northwestern University, the Pennsylvania State University, the George Washington University, and Iowa State University, where he earned his Ph.D. and Master's degrees in quantitative economics.

Dr. Walker's special expertise is developing quantitative analyses to represent financial and economic situations using sample and population data. He has applied this expertise to a variety of research questions, consulting opportunities, and legal issues.

Research

Dr. Walker has published seven books and monographs, 55 scholarly, peer-reviewed articles, and presented many research and policy studies at professional meetings. The topics include financing and operations of global and domestic financial service firms, financing small companies, mutual fund performance, trade credit demand and supply, and monetary and fiscal policies for emerging market economies. His recent published papers are: "Long-Run Credit Growth in the U.S," *Journal of Economics and Business*, "Presidential Election Forecasts," *The Forum*, "Impacts of Bank Acquisitions on Shareholder Returns" in *Bank Accounting & Finance,* "Predicting Presidential Election Results" in *Applied Economics,* and "Emerging Markets' Deficits, Privatization, and Interest Rates" in *Economia Internazionale.*

Teaching and Lectures

Professor Walker teaches a variety of courses on global financial markets and institutions, applied macro-economics, and managerial economics. At various times he has taught courses in management science, micro-economics, mathematical economics, and statistics. He has also lectured and conducted courses in Australia, China, Estonia, Hungary, India, Japan, Poland, Singapore, and Thailand and was previously selected for a Fulbright Award in India. Dr. Walker recently testified in front of the House Committee on Small Business concerning small business credit costs and supply.

Consulting

Dr. Walker is currently a consultant to the World Bank, the Promontory Financial Group and Nathan Associates. He has served as consultant to the World Bank, the U.S. Department of the Treasury, the U.S. Small Business Administration, and numerous companies. For the World Bank, Dr. Walker is currently involved in a project on contracting public services to the private sector in The Philippines and previously he and several colleagues developed models to identify factors that would lead to successful ventures for new firms in emerging markets. Dr. Walker was a member of a blue ribbon commission to review the Treasury's efforts to implement of electronic processing and payments options for Treasury Bill accounting and to reduce paper processing and bookkeeping.

Dr. Walker has analyzed trade credit availability and demand for the U.S. Small Business Administration (SBA). He also developed cases for state and local governments' delineating their experiences contracting services with the private sector. Dr. Walker created the SBA proposal for a small business loan guarantee program with a secondary capital market. He has published studies on financing small firms through venture capital, informal investment, trade credit, and bank credit.

Dr. Walker's consulting work with Nathan Associates has involved price fixing cases, studies of long-term debt and equity levels and their impacts on Federal revenues and expenditures, and review of numerous other projects. He serves on the academic Advisory Board for the firm, with which he has had an affiliation for more than 25 years.

Case Experience

Dr. Walker has been qualified as an expert economist by eight Federal, state and local courts and for the Federal Energy Regulatory Commission. Dr. Walker has completed legal, case-oriented economic analyses for a variety of clients. His clients have included: prestigious and smaller law firms, the U. S. House of Representatives, Nathan Associates, Memphis Gas & Light Company, the District of Columbia, and Dunkin' Donuts, Inc.

The issues on which he has qualified or been retained to provide expert reports include: lost income, valuation of financial assets, bank management and financial practices, financial institutions' asset portfolio management, costs of capital, bank share valuations, profit projections for privately held firms and franchises, business profits and sales and personal income projections, and valuation of professional medical, legal, and business services.

HONORS AND RECOGNITION

Elected member, The Cosmos Club, 2009
Who's Who in America - 48th edition and all later editions
Who's Who in the East - 22nd edition and all later editions
Who's Who in the American Education
Who's Who of Emerging Leaders in America
Who's Who in Finance and Industry
American Men and Women of Science – Economics
National Defense Education Act Fellowship, 1962-1964
Southern Finance Association Service Award, 1987
Financial Management Association Service Award, 1991, 1995, 2005
Beta Gamma Sigma, 1999
McDonough School of Business Distinguished Service Award 1987, 2005

TEACHING

Georgetown University Full-Time Faculty (1980-present)

Courses
Financial Services Management, graduate, 2 sections
Macro-economics - graduate, 7 sections
Global Financial Markets and Institutions - graduate, 7 sections
Global Financial Markets and Institutions - undergraduate, 38 sections
Management Science - graduate, 2 sections
Managerial Economics - graduate, 6 sections
Managerial Finance - graduate, 2 sections; undergraduate, 2 sections

Thesis Committees
Victoria Lynn Zyp, Arab Studies, M.A., 2009
J. D. Foster, economics, Ph.D., 1989
Walid Hasheur, economics, Ph.D., 1983
David Leahigh, economics, Ph.D., 1982
James W. Fay, economics, Ph.D., 1981
Richard Browning, economics, Ph.D., 1980

RESEARCH

BOOKS

Small Business in America, Institute fur Wirtschaftspolitik an dur Universitat Zu Koln, Koln, 1989.

Mathematical Programming for Economics and Business, Iowa State University Press, January 1976 (with R. C. Pfaffenberger).

Mathematics for Economic and Business Analysis, Goodyear Publishing Co., March 1976 (with R. E. Forsythe).

RECENT REFEREED JOURNAL ARTICLES

"Long Run Credit Growth in the U.S." (with Thomas Durkin and Keith Ord), Journal of Economics and Business, forthcoming.

"Presidential Election Forecasts," The Forum, A Journal of Applied Research in Contemporary Politics, (editorial referee), December 2008.

"Emerging Markets' Deficits, Privatization, and Interest Rates," Economia Internazionale, February 2007.

"Performance Persistence in Fixed Income Mutual Funds," (with William G. Droms), Journal of Economics and Finance, Fall 2006.

"Impact of Community Bank Mergers on Acquiring Shareholder Returns" (with Alan Mayer-Sommer and Sharon Sweeney), Journal of Performance Management, Vol. 16, No. 1, 2006.

"Predicting Presidential Election Results," Applied Economics, March 2006.

"Effect of Bank Acquisitions on Shareholder Returns," (with Alan Mayer-Sommer and Sharon Sweeney), Bank Accounting and Finance, July 2005.

"Financial and Economic Determinants of Privatization," Economia Internazionale, February 2002.

"Performance Persistence of International Mutual Funds," (with W. G. Droms), Global Finance Journal, December, 2001.

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COMPLETED PAPERS UNDER REVIEW

"Anticipating Presidential Election 2012"

"Costs of Short-Term Credit for Small and Large Firms"

"Impacts of TARP on Commercial Banks" (with Max Gaby)

"Privatization and Fiscal Deficits in European Emerging Markets" (with Christina Hunt)

RESEARCH IN PROGRESS

A Macro-Dynamic Economic Policy Model of the US

Exiting US Economic Recessions (with Reilly Davis and Keith Ord)

LONG-RUN CREDIT GROWTH IN THE US

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LONG-RUN CREDIT GROWTH IN THE US

ABSTRACT

The paper explores the long term income elasticity of consumer and mortgage credit growth since World War II. It also examines other economic factors, to determine whether recent credit use is anomalous. Two-stage least squares shows consumer credit income elasticity to be slightly below 1.0, taking other factors into account. A vector autoregressive error correction (VAREC) model for cointegrated variables with unit roots determine short-run and long-run credit impact multipliers which are consistent with the elasticities. Except for 1974-1979, the long-run consumer credit impact multiplier of 0.23 is very close to the debt-income limit that Enthoven projected as long ago as 1957. These results are very different from the simplistic media perspectives.

I. INTRODUCTION

Many observers blame the recent credit crunch and associated volatility in financial markets as arising in large part from two circumstances: some consumers' misuse of credit and some lenders making credit available to borrowers who were unlikely to be able to satisfy their credit obligations in the long run. Before the credit crisis, it appeared that these consumers might be able to satisfy their obligations because (1) many borrowers with large obligations only needed to pay the interest on their loans, with no principal repayment, and (2) both consumers and lenders assumed housing prices would increase substantially before payments adjusted to higher levels, allowing consumers to refinance as needed. In some cases, mortgage borrowers were not even obligated to pay all of the interest on their mortgages: their commitments were scheduled to "reset" to require higher interest payments plus principal amortization that they might not be able to afford, but the resets were scheduled for later, when house prices (and the borrowers' incomes) were expected to have risen.

Much of the recent discussion of the amounts of new mortgage debt advanced and lenders' practices in extending it mirrors similar kinds of complaints about profligate consumers and over-eager lenders leveled at non mortgage consumer credit market participants for decades, notably including credit card users and providers in recent years. But because of recent widespread concern about debt growth, it is an ideal time to reexamine the long run experience concerning consumer's use of both consumer and mortgage credit. Consequently, this paper examines empirically the long term trends of how American consumers have used consumer and mortgage credit. The empirical emphasis is on real, rather than nominal, levels of credit, adjusting for inflation. Whenever a recession appears to be on the horizon or when financial markets are somewhat volatile, the media portrays the American consumer as being overextended in credit markets, but these reports usually do not adjust for growth in disposable incomes and other factors and/or increases in prices over time. They also do not note how current cyclical experience relates to longer term trends. More technically, there are surprisingly few recent analytical research studies to support or to dispel the reports of long term explosive use of consumer and mortgage credit often found in the popular press, despite the attention to short term fluctuations in aggregate consumer debt (CC + MC) and its components, and their impacts on volatility in the financial markets.[1]

Section II reviews trends in credit and other related macro-economic variables over the past 60 years. It provides a foundation for analysis of long run credit trends by examining some basic perceptions and reviewing two of the major, older analytical studies on consumer credit growth. Reviewing these older studies partly reflects the relatively limited analytical attention that the subject has received, but these older studies also provide the basis for hypotheses that continue to be relevant. The data and long term credit trends are discussed in Section III as a basis to develop dynamic credit models. The dynamic autoregressive models with error corrections, parameter estimates, and impact multipliers for consumer and mortgage credit are developed in Section IV, which includes discussion of the degree to which credit growth in 2007-2008 was predictable from prior experience. Section V provides an application of the model to forecast the credit levels for the unusual years of 2007 and 2008. The conclusions follow in Section VI.

II. PERCEPTIONS AND EARLY STUDIES

Perspectives on Long Term Growth

Although the Federal Reserve's Flow of Funds Accounts clearly show that the consumer sector of the U.S. economy is actually a net lender in financial markets (usually through financial intermediaries), households still borrow substantial amounts for housing, durable goods, education, and other purposes. Continuing a long term trend toward higher nominal debt levels, borrowing by households grew sharply in the cyclical expansions of the past few decades. For example, total non mortgage consumer credit outstanding (CC), which is an important component of household liabilities, increased more than ten fold over the period 1975-2006 and approximately tripled in real terms (see Table 1), thereby providing financing for a significant portion of major consumer outlays during those years. Many other household economic measures have also risen sharply over this period and generally in the years since World War II, including employment, income, assets, and wealth.

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[1] See references for a bibliography, including a few studies not otherwise referenced here.

TABLE 1 HERE PLEASE

Despite the obvious cyclical contribution of credit availability to support the expansion of consumer spending (and economic growth), the increase of consumer debt in cyclical upswings inevitably leads to expressions of concern.[2] Because the periods of most rapid growth in consumer credit usually occur early in the business cycle, later cyclic stages are perennially subject to the contention that consumer debt has risen "too fast" or that the level has become "too high." Doomsayers assert that high and increasing debt levels lead inevitably to overindebtedness and are likely to cause delinquencies, a spending slowdown, recession, and rising unemployment. Some of this concern is directed towards housing-related debt, especially recently in the subprime area, but much concern aims also at consumer credit, in the recent past decades particularly at credit card debt. Certainly, communications media pronouncements about consumer credit growth have generally been dismal (see Durkin and Jonasson, 2002). It is difficult to estimate how influential such statements have been, if at all, but even the casual empiricism of asking one's neighbors for their views of the domestic credit picture reveals the widespread notion that consumers' credit use has grown too fast for too long.

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[2] See, for example, front-page articles in the Wall Street Journal for June 17, 1964, January 29, 1970, March 26, 1973, June 28, 1977, December 2, 1985, and February 2, 1987, for some older expressions of concern. More recently, see August 2008 – January 2009 series "The Debt Trap" in the New York Times.

One possible cause for consumer credit growth is the hypothesis of consumer profligacy and some sort of inexorable desire to live beyond one's means. Other possible explanations for credit growth range from statistical artifacts associated with how the data are collected to changing population demographics and generally greater macro-economic stability after the Great Depression and World War II that have produced a greater willingness to accept risks sometimes associated with increased leverage to support larger portfolios of productive assets.

There is also the possibility that leverage, or more properly the asset accumulation that greater leverage assists, is a luxury good where an income elasticity greater than unity might reasonably be expected. There is no reason why debt measures should remain the same as income rises. Credit, or at least large purchases like housing, large durable goods including vehicles and appliances, home modernization, college educations, and major hobby items often associated with credit use are mainly luxury goods. As such, they are precisely the kinds of purchases that might be expected as income rises. Under these circumstances, then credit use would also reasonably be expected to rise as income rises. This paper does not explicitly attempt to model the behavioral foundations of such a possibility, but presents an empirical approach to exploring correlates of postwar credit growth and explaining the trends empirically.

FIGURE 1 HERE PLEASE

Figure 1 shows annual percentage growth rates for consumer and mortgage credit 1946 - 2006. It is immediately apparent that credit growth has not been steady: annual growth rates have fluctuated substantially over the business cycles. More interesting is how the cyclical episodes have been relatively similar, excluding the unprecedented and unduplicated upheavals associated with the aftermath of the Great Depression of the 1930s and the period of consumer credit restrictions during World War II. Annual growth of consumer credit outstanding peaked in each of the other cyclical episodes of the post World War II period at roughly a 15-19 percent growth rate for a short period in each upswing. The all time postwar highs occurred in the earliest post World War II period when consumer credit was responding to the end of wartime controls during the 1940s. The postwar annual growth rate in mortgage credit has been somewhat less sharp in its cyclical fluctuations in the postwar period, reaching a peak growth rate of 16-17 percent in the early 1950s and again in the 1970s. There has not been a recent sharp increase in the growth rates in either series. Although the relatively consistent pattern does not provide a forecast, it is an indication that the growth of consumer and mortgage credit in recent decades is not anomalous or startling in percentage terms. Consumer and mortgage credit outstanding grew rapidly in recent cyclical upswings, but they always have done so in upswings. The question is what economic conditions and variables are associated with consumer and mortgage credit growth.

Enthoven and Hunter Studies

Relatively few econometric studies have examined the long term growth of consumer credit.[3] Two of the most interesting papers were published more than a generation ago by Alain Enthoven (1957) and Helen Manning Hunter (1966). There are subsequent studies (many in the bibliography), but few are as interesting or insightful.

Enthoven was not attempting to model consumer credit use behavior explicitly, but he designed a dynamic model based on cross section evidence of consumers' credit use to explain the rapid growth of consumer credit and the rise of the debt-income ratio after World War II that caused so much concern in the mid 1950s. He assumed the future economy would be characterized by increasing aggregate income due both to increasing population and rising household income. If consumer credit use were chiefly among younger families as the cross section evidence suggested, then credit outstanding would increase as the population increased. Enthoven postulated a dynamic growth model to demonstrate the implications of these basic assumptions. The solution to his first-order differential equation showed that the debt-to-income ratio would approach a long run asymptotic stable limit from below, dependent upon (1) the ratio of the growth of consumer credit relative to income and (2) the growth rate of income itself.

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[3] For discussion of consumer credit growth and especially its cyclicality, see Prell (1973), Luckett and August (1985), and Johnson (2005). There is further discussion of relevant studies at greater length in Durkin, Elliehausen, Staten, and Zywicki (2010), Chapter 2.

Using the debt and income growth experience for 1945-1956 as the basis of his parameters, Enthoven derived the conclusion that the long term expectation for the ratio of consumer installment credit to income was approximately 19 percent. Since this asymptotic ratio was higher than the aggregate installment credit to income ratio at the time (it was between 9 and 10 percent in 1954-1956), he concluded that the ratio could continue to rise for some time, despite contemporary concern over credit growth.

FIGURE 2 HERE PLEASE

Despite the simplicity of Enthoven's growth model, it is useful. His prediction has been quite consistent with experience. Although consumer credit growth has been intensely cyclical over the past five decades, and his model is based on a simple (non cyclical) growth path, the aggregate consumer credit to income ratio (the only available consumer credit measure today) appears to have approached an asymptotic limit of 20-25 percent (see Figure 2), only a bit above Enthoven's 1957 projection, based only on installment credit. Data on non installment credit like department store charge cards, which were more important 50 years ago, were available separately then and might have been included. This would have raised the asymptote somewhat.

Consumer credit outstanding has never exceeded the prediction of his model by very much, and still does not (Figure 2). The ratio of consumer credit outstanding to income converged with the path of the level predicted by a rolling Enthoven model (using moving averages for each of the necessary parameters) by the early 1970s, and the two ratios have tracked one another remarkably closely since that time. An "adjusted" actual consumer credit ratio to income, the third line in Figure 2, assumes that 15 percent of aggregate revolving consumer credit arises in the official statistics from "convenience use" of credit cards, that is, balances that some consumers will pay in full upon receipt of the bill. This series hypothetically eliminates non installment credit from consumer credit and tracks the reconstructed Enthoven limit even more closely than the trend constructed using the official statistics. At year-end 2006, consumer credit outstanding relative to income exceeded the limit predicted by the rolling 1957 model by less than three percentage points, despite decades of contentions that consumer credit has grown "too fast." Relative to income, the series adjusted to remove some "convenience credit" exceeded the rolling Enthoven model by only about one percentage point (Figure 2, dotted line). Again, as with annual percentage change in consumer credit illustrated above, it does not appear that there is anything in the Enthoven perspective of consumer credit trends which suggests that credit experience until 2006 was in any way anomalous.

About a decade after Enthoven's contribution, Helen Manning Hunter (1966) developed a behavioral model of the long term growth of consumer credit based upon her interpretation of relationships revealed in consumer surveys of credit use. Her goal was to employ existing evidence of individuals' credit use to develop hypotheses explaining the high growth of aggregate consumer credit relative to disposable income over the years 1910-1962. This is the same issue explored by Enthoven, although he focused on the postwar period, and he did not try to develop or to estimate the parameters of a behavioral equation.

Based upon the findings of earlier cross section studies by Lansing, Maynes, and Kreinin (1957) and Miner (1960), Hunter hypothesized that liquid asset holdings, income, change in income, and life cycle stage of individual consumers were the most relevant variables to explain credit growth. She estimated an equation where various measures of consumer credit outstanding or extended were a function of population, average income, and liquid assets.

Hunter's parameter estimates probably do not exhibit long run stability to the 21st century because they depended so much on the depression years of the 1930s and the immediate postwar years, 1946 through the 1950s. She excluded war years 1917-1919 and 1942-1945 as probably abnormal. However, Hunter's analysis of the relevant underlying variables remains useful. Credit use is related to population and income growth, as Enthoven suggested, and possibly to liquid asset changes, even if income elasticity of credit growth does not appear to be as high as Hunter found, now that the effects of the depression of the 1930s and wartime credit restrictions of the 1940s and early 1950s are more distant. Re-estimation of an updated Hunter type equation may have explanatory power over the longer postwar period. Both Enthoven and Hunter demonstrate an important role for income growth in explaining consumer credit growth (income elasticity).

Enthoven's and Hunter's results, as well as the dramatic changes in US financial markets, products, institutions, wealth, and population since their publication, make this a particularly interesting time to explore whether consumer and mortgage credit have recently increased relative to other economic factors. As indicated, the media continue to portray credit usage as being out of control whenever business cycles and economic conditions appear to deteriorate. Much of the time there is no distinction between short term and long term trends.

III. DATA AND TRENDS

Data

Over the long term, both real consumer credit excluding mortgage credit and real consumer credit probably have been influenced by a wide range of factors that can be classified either as macroeconomic influences or consumer factors (Table 2). Most of the variables in the table potentially reflect both supply and demand influences, as necessary for a truly long run analysis.[4] Data for most of these variables are available in the Federal Reserve Flow of Funds Accounts; these extensive time series permit a long-run perspective on some of the questions that Enthoven, Hunter, and others have considered. These data allow a truly long run analysis that spans numerous business cycles and recessions, periods of considerable economic growth, several war periods, housing bubbles, and credit crunches. The Flow of Funds data are updated and revised regularly so that definitions are as consistent as possible over time and trends can be identified that may not be evident from other sources or over shorter periods.

TABLE 2 HERE PLEASE

Regression Models

To examine consumer and mortgage credit growth in a multivariate framework, linear and log-linear regression models are estimated for 1946 – 2006 to test influences of variables that Hunter explored. The log-linear models are easier to interpret and make more sense for a lengthy time series because the coefficients are directly observable long run elasticities. To estimate elasticities for the linear models, the slopes must be evaluated at a particular point in time, such as the mean of the time series, which provides elasticity at approximately the midpoint between 1946 and 2006. The midpoints in these time series (approximately 1976) are not of particular interest or significance, relative to the whole credit time series.

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[4] In an interesting paper, Gross and Souleles (2002) found an influential role for supply changes in the form of credit line increases and interest rate changes in their micro study of credit card credit, but they did not have information on consumer demand influences and the study concerned only a short segment, approximately one year, of one business cycle episode.

For many consumers, levels of consumer and mortgage credit may be jointly determined. This is tested by estimating two-stage as well as ordinary least squares models. Consumer credit is expected to be influenced by mortgage credit levels, but the reverse is not so likely. After obtaining a new mortgage, purchasers may pursue additional consumer credit to settle into the abode, to maintain it, and to satisfy the desires associated with home ownership. After increasing consumer credit significantly, however, it is not so likely that a borrower will be able to obtain new mortgage credit, unless a prospective borrower has significant other assets.

The substantive hypothesis for this approach and the foundation for the dynamic credit models is that consumer and mortgage credit each grow with real disposable income and that there may be other important explanatory factors for each. The factors may or may not be the same for consumer and mortgage credit. Preliminary tests show that mortgage credit levels influence consumer credit but not vice versa. Consequently, two stage least squares is applied to estimate growth elasticities for consumer credit but not for mortgage credit. The classical auto-regressive transformations are employed to remove autocorrelation.

Tests show that the log linear models also have higher coefficients of determination, and so the linear models are eliminated from further consideration. The results for these log linear models are presented in Appendix Tables A.1 - A.4.

Results show that the consumer credit income elasticity is 0.97 and mortgage credit income elasticity is 0.54 for 1946 – 2006 (Table 3), taking other economic factors into account. In other words, neither suggests long term explosive credit growth relative to income, after taking account of other factors, despite the cyclicality of credit growth that sometimes produces rapid growth for a period of time. Other significant explanatory variables include long term interest rates – represented by the corporate AAA bond rate (CORPAAA), total consumer assets in real terms (TA/CPI), and unemployment. As expected, higher real incomes, lower long term interest rates (costs of funds), and greater levels of consumer assets explain larger amounts of mortgage credit outstanding using this approach. Consumer credit outstanding is not a significant explanatory factor for mortgage credit, but, as expected, mortgage credit is significant in explaining consumer credit growth, the reason for using two stage least squares for the consumer credit equation. The percentage of variation of the dependent variable that is explained by the models is .99 for each model with AR(1) and AR(2) corrections.[5]

TABLE 3 HERE PLEASE

The equations are also estimated including a series of binary variables representing the individual business cycles of post World War II to examine any anomalous cyclic episodes. Table 4 defines binary variables to allow testing for effects of business cycles on consumer and mortgage credit models.

TABLE 4 HERE PLEASE

For the dependent variable log(real mortgage loans), none of the intercept or slope binary variables has a statistically significant coefficient. Table 5 provides consumer credit log linear models that include the binary variables defined in Table 4. Except for 1990-2000, the coefficients of binary intercept and slope variables (IV9000 and IV9000*RDPI, respectively) are not statistically significant, and then only for consumer credit. For this period, the income elasticity of consumer credit growth is 1.6141 (.9997 +.6144). Much of the growth in consumer credit during this period is due to growth in the use of credit cards. Johnson (2005) studied this period in more detail and concludes that declines in credit card interest rates in a competitive environment, greater availability of credit cards to riskier borrowers during these years, and growing use of credit cards for transactions purposes (as opposed to credit use) led to increased card credit in the official statistics. These explanations fall well short of runaway consumer profligacy. Because wealth effects are also a possibility, asset and wealth levels and the University of Michigan Consumer Sentiment Index are included in the specification. Total assets proved statistically significant at the .05 level in the mortgage credit but not in the consumer credit equation.[6]

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[5] A variety of additional explanatory variables from Table 2 were tested to examine possible associations with real consumer and mortgage credit levels (Tables A.3 and A.4). None of consumer wealth, financial assets, debt, or liquid assets variables improve the model over the specifications in Table 3. Structural variables test whether or not it was a war year, whether or not the 1986 tax revisions had an impact on mortgage or consumer credit outstanding, the effects of levels of consumer confidence, represented by the University of Michigan survey, and whether or not it was a recession year. The only significant factor over the long period was whether the economy was in a recession year, and when this consideration was included, the significance of the coefficient of real assets deteriorates relative to other specifications.

TABLE 5 HERE PLEASE

Although these results provide income elasticities for consumer and mortgage credit, they do not reveal whether the individual credit time series are stationary (with no unit root) or whether the two credit measures are cointegrated. These issues are explored, along with dynamic models, in the following section.

IV. DYNAMIC MODELS

To explore more fully, long term growth of consumer and mortgage credit, separately and jointly, vector autoregressive models are developed below. Vector autoregressive estimators with error correction (VAREC) provide dynamic long term economic models and credit impact multipliers. The VAREC models are formulated from the log-linear OLS and two stage regression models in Table 3. VAREC models allow tests of joint long-term growth of consumer and mortgage credit. The process requires tests for unit roots, cointegration, and VAREC parameter estimates.

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[6] A series of events from 1978 to the early 1980s eliminated rate ceilings (usury ceilings) from credit cards (Supreme Court case Marquette National Bank of Minneapolis vs. First of Omaha Service Corp., 439 U.S. 299), mortgage credit (Monetary Control Act, 12 U.S.C. 226), and some other kinds of credit in some places (various state actions). These actions enabled lenders to continue to offer credit products when interest rates rose, and over time they contributed to making credit markets more competitive overall. During the years after these events, interest rates generally fell, however, and the impact of growing competition likely was gradual. In any event, changes during these years would be accounted for in the equations by the TAX86 variable, which equals 1 for these years and 0 otherwise. Likewise, technological change in credit management during these years due to advances in statistical credit scoring methodologies that also likely enhanced competitive conditions would be accounted for by the same variable.

Tests for Unit Roots and Cointegration

Figure 1 shows that real consumer credit excluding mortgage credit (RCC = CC/CPI) and real mortgage credit outstanding (RMC = MC/CPI) have both grown extensively since 1946. This evidence suggests two hypotheses for dynamic analysis:

H1: RCC and RMC are non-stationary with one unit root, or integrated of order one, I(1)

H2: RCC and RMC are cointegrated.

Testing H1 requires an Augmented Dickey – Fuller (ADF) test. The existence of one unit root is confirmed for each series.

Letting *Z* represent RCC and then RMC, H1 is tested applying two models:

$$Z_t = \beta_0 + \rho Z_{t-1} + \beta_1 \Delta Z_{t-1} + \beta_2 \Delta Z_{t-2} + \varepsilon_t \qquad (1)$$

Equation (1) allows the ADF test for a unit root in RCC and RMC, where the null and alternative hypotheses are H_0: $\rho = 1$ and H_A: $\rho < 1$. Replacing RCC and RMC by ΔRCC and ΔRMC, respectively, for Z in equation (1), allows testing for a second unit root with the same model.

The ADF test provides t-statistics for equation (1), -2.62 for RCC and -1.63 for RMC, both of which are above the 5 percent critical value of -2.91. The null hypothesis cannot be rejected and the conclusion is that each series has a unit root. For the first differences of RCC and RMC, the t-statistics are -4.23 for ΔRCC and -3.25 for ΔRMC, which are below -2.91, so the hypothesis of a second unit root is rejected. Removing either the second lag term or the constant from equation (1), produces similar results and the same conclusion.

Since both series are I(1), whether they are cointegrated is determined using Johansen's test (Johansen, 1991). Of the various cases allowed in this testing regime, the most appropriate assumption appears to be "Series that have means and linear trends, but the cointegrating equation has only an intercept," that is, case 3 of the five possibilities for the Johansen test. The results (developed using EVIEWS 5) are summarized in Table 6. There is a single cointegrating relationship between the consumer credit and mortgage credit series

Table 6. Johansen Cointegration Tests

Hypothesized cointegrations (logRCC & logRMC)*	Trace statistic	5% critical value	probability
none	20.2629	15.49	0.0088
at most 1	0.4348	3.84	0.5097

Cointegration equations: one at 5%
* linear deterministic trend

Autoregressive Models and Impact Multipliers

A vector autoregressive model with an error correction term (VAREC) accommodates the cointegration (Engle and Granger, 1987). This model takes the general form

$$\begin{pmatrix} \Delta RCC_t \\ \Delta RMC_t \end{pmatrix} = \begin{pmatrix} \beta_{0C} \\ \beta_{0M} \end{pmatrix} + \begin{pmatrix} \beta_{1CC} & \beta_{1CM} \\ \beta_{1MC} & \beta_{1MM} \end{pmatrix} \begin{pmatrix} \Delta RCC_{t-1} \\ \Delta RMC_{t-1} \end{pmatrix} + \begin{pmatrix} \beta_{2CC} & \beta_{2CM} \\ \beta_{2MC} & \beta_{2MM} \end{pmatrix} \begin{pmatrix} \Delta RCC_{t-2} \\ \Delta RMC_{t-2} \end{pmatrix} + \begin{pmatrix} \beta_{3C} \\ \beta_{3M} \end{pmatrix} X_t + \begin{pmatrix} \gamma_C \\ \gamma_M \end{pmatrix} EC_{t-1} + \begin{pmatrix} \varepsilon_C \\ \varepsilon_M \end{pmatrix}$$

The error correction term is:

$$EC_t = RCC_t + \alpha_0 + \alpha_1 RMC_t$$

The model may include exogenous variables, *X*. Several models are estimated, including the exogenous variables listed in Table 2 and each set of binary variables listed in Table 4, to reflect the nine business cycles since World War II. Binary variables are tested to see if the intercept and the effect of log(RDPI) are different for each business cycle. No binary variable is tested for 1946 – 1952 because this period is reflected in the intercept and slope.

The most significant statistical evidence includes intercept binary values for 1974-1979 and 1980-1989 and a slope binary variable for 1974-1979 (Table 7). The t-statistic for the cointegration coefficient that includes these three binary variables is highly significant, and the binary variables are all statistically significant at a meaningful level. Including these three binary variables provides the highest R-square and the best fitting model, minimizing the system's Akaike information criterion. The statistical results for alternatives in Table 4 are summarized in Table 5 and are substantially inferior to those provided in Table 7.

TABLE 7 HERE PLEASE

Including these binary variables in the VAREC models provides results in terms of differences with lag intervals for endogenous variables ΔlogRCC and ΔlogRMC. Lag intervals must be specified for the two endogenous variables to capture the expected autoregressive responses within and between the two endogenous variables.

The following conclusions result from Table 7:

1. The logRCC and logRMC series are non-stationary but move together as shown by the earlier tests.

2. ΔlogRCC does not have an autoregressive relationship at lags 1 and 2.

3. ΔlogRMC has a positive autoregressive relationship at lag 1, a negative relationship at lag 2, and a significant negative cross correlation with ΔlogRCC at lag 1.

4. Both variables have significant positive relationships with ΔlogRDPI and significant negative relationships with CORPAAA.

5. Two binary variables (IV7479, IV8089, and the interaction IV7479*ΔlogRDPI are important for both ΔlogRCC and ΔlogRMC.

Impact Multipliers

The coefficients of Δlog(RDPI) in Table 7 are credit impact multipliers. Dynamic short-run impact multipliers for real consumer credit and real mortgage credit in response to changes in real disposable income can be determined directly from the VAREC model in Table 7. The short-run impact multipliers are the coefficients of ΔlogRDPI, except for 1974-1979 when the multipliers are the sum of the coefficients of ΔlogRDPI and IV7479*ΔlogRDPI from the VAREC models. The long-run elasticities are "equilibrium" solutions to the models in Table 7. The long-run consumer credit multiplier can be determined, assuming

$\Delta \log RCC_t = \Delta \log RCC_{t-1} = \Delta \log RCC_{t-2}$ and $\Delta \log RMC_t = \Delta \log RMC_{t-1} = \Delta \log RMC_{t-2}$,

and determining simultaneous solutions to the equations in Table 7. These results for consumer credit are in the upper panel of Table 8.

Table 8. Consumer Credit Impact Multiplier and Income Elasticity

1. VAREC results (from Table 7)

	Short-run		Long-run	
Impact multiplier	Except 1974-1979	1974 -1979	Except 1974-1979	1974-1979
Consumer Credit	0.3785	1.5081	0.2280	1.0902

2. Elasticity - Impact Multiplier Links

	Elasticity (ΔRCC/ΔRDPI) (RDPI/RCC)	Impact Multiplier (ΔRCC/ΔRDPI)	Inverse Ratio (RDPI/RCC)	Ratio (RCC/RDPI)
Consumer credit	1.01	.23	4.41	.2268

This panel shows that the long-run consumer credit impact multiplier, outside of the mid seventies, is very close to Enthoven's 1957 estimate of the limit of the debt-income ratio of 0.21

for 1946-1950, 0.17 for 1950-1956, 0.21 for 1954-1956, and 0.19 for 1945-1956. The only substantial difference is for the mid 1970s, which warrants further investigation.

The lower panel of Table 8 contrasts two-stage least squares consumer credit elasticity for 1946-2006 (from Table 3) with the long-run consumer credit multiplier from the same period derived from the VAREC models with the binary variables for 1974-1979 and 1980-1989 (from Table 7). There is consistency between the consumer credit elasticity and impact multiplier. The credit elasticity is the product of its impact multiplier and the real disposable income - real credit ratio or factor (1.01 = .23 x 4.41). The consistency is proved by comparing the inverse of the factor or ratio of real credit to real disposable income with aggregate US income data. The Flow of Funds Accounts demonstrate the aggregate ratio of these two variables has fluctuated within the relatively narrow range of .17 to .25 for more than 45 years.

V. FORECASTING 2007 AND 2008

Expectations and method

The data (1946-2006) and estimated consumer and mortgage VAREC model (Table 7) can be applied to predict the levels of RCC and RMC for 2007 and 2008. (References to RCC and RMC in this section are to ΔlogRCC and ΔlogRMC.) With the benefit of hindsight, the performance of the U.S. economy for these two years suggests that the long-term model, estimated from World War II through the economic boom of 2001-2006, should over-predict the actual levels of consumer and mortgage credit for 2007 and 2008. Since the economy began sliding into recession towards the end of 2007, only slight over-estimates would be expected for that year. Likewise, it is not anticipated that the dramatic 2008 recession would be forecast by the long-term model, given the factors taken into consideration.

Forecasting RCC and RMC for 2007, requires RCC and RMC for 2006 and 2005, estimated EC for 2006 using RCC and RMC for 2006, and contemporaneous values for RDPI and CORPAAA. Thus 2007 data were used for RDPI and CORPAAA so that the forecasts are ex-post rather than ex-ante. Similarly, the forecasts for 2008 employ revised data for 2007 for RCC and RMC, estimated EC for 2007, and 2008 data for RDPI and CORPAAA. Forecasted 2007 values for RCC and RMC could be employed in forecasting 2008, but we prefer to focus upon one-step-ahead forecasts.

Results

Table 9 shows the forecast errors for 2007 and 2008 for both consumer and mortgage credit relative to the actual values available both in December 2007 and December 2009. For 2007, the forecast RCC and RMC errors from the estimated VAREC model are 1.39 percent and 0.49 percent, respectively. The revised 2005 and 2006 values of RCC and RMC and 2007 values for RDPI provide very similar forecasts, with slightly smaller error for RCC (0.89 percent) and larger error for RMC (1.64 percent). The results for 2008 are even more interesting. The worst recession since the depression has been identified by the National Bureau of Economic Research to have begun in December 2007 and the financial crisis that followed suggest that an effective long-run model should not be expected to forecast 2008 credit levels without significant error, especially for mortgage credit. The 2008 forecast errors are 6.47 percent for consumer credit and 11.25 percent for mortgage credit, and somewhat smaller employing the revised 2005-2008 data that became available in 2009.

The 2008 forecast errors would surely be expected to be larger than the 2007 errors. According to a December 7, 2009 Federal Reserve press release, within 2008 there was considerable credit volatility. Consumer credit peaked in July 2008 at $2.6 trillion and declined for nine consecutive months; forecasts based upon shorter time periods would clearly show a different picture.

Table 9. Forecast Errors for 2007 and 2008

	Actual data available in 2007		Actual data available in 2009	
	Δlog RCC	Δlog RMC	Δlog RCC	Δlog RMC
2007	-0.0139	-0.0049	-0.0089	-0.0164
2008	-0.0647	-0.1125	-0.0626	-0.0942

VI. CONCLUSIONS

Enthoven in the 1950s and Hunter in the 1960s, contributed valuable analytical studies on long run trends in consumer credit, but there are relatively few sophisticated studies in this area since their work. The media often offer judgments about credit activity and imply that trends and circumstances have changed dramatically in recent years. This study provides a time series analysis of consumer and mortgage credit trends since World War II and shows that credit growth has not changed so dramatically since then.

A vector autoregressive error correction (VAREC) model provides short-run and long-run credit impact multipliers for consumer credit. The VAREC impact multipliers are consistent with the two stage least squares elasticities. Except for six years at the end of the seventies, the consumer credit impact multiplier of 0.23 estimated here is very close to the credit-income limit that Enthoven projected more than 50 years ago.

One test for the effectiveness of the estimated consumer and mortgage VAREC model is to examine whether it performs as expected outside of the estimation period. Forecasted levels for RCC and RMC for 2007 and 2008 should and do over-predict the actual levels of consumer and mortgage credit for 2007 and 2008. Since the current recession began towards the end of

2007, only slight over-estimates are expected and observed for that year. As expected, for 2008 credit levels are over estimated with significant error.

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Table 1. Selected Measures of Assets, Debts, and Income of American Consumers, Selected Years, 1945-2006

	1945	1955	1965	1975	1985	1995	2005	2006
				Current Dollars (billions)				
Disposable Personal Income[1]	161	283	498	1187	3109	5408	9036	9523
Total Assets	742	1569	2868	5902	16,572	32,612	64,014	68,920
Financial assets	560	1015	1954	3665	9938	21,386	38,886	42,116
Deposits	104	172	373	908	2506	3332	6049	6870
Other financial	456	843	1581	2757	7432	18,054	32,837	35,446
Total Liabilities	30	144	352	761	2360	5052	12,220	13,293
Home mortgages	19	88	219	459	1442	3325	8883	9676
Consumer credit	7	43	98	207	611	1169	2327	2438
Other liabilities	4	13	35	95	307	558	1011	1179
Net Worth	711	1425	2516	5142	14,211	27,560	51,795	53,626
				2006 Dollars (billions)				
Disposable Personal Income[a]	1803	2129	3187	4448	5825	7153	9327	9523
Total Assets	8310	11,803	18,355	22,116	31,049	43,140	66,079	68,920
Financial assets	6272	7635	12,506	13,734	18,619	28,290	40,140	42,116
Deposits	1165	1294	2387	3402	4695	4408	6244	6870
Other financial	5107	6341	10,118	10,331	13,925	23,882	33,896	35,446
Total Liabilities	336	1083	2253	2852	4422	6683	12,614	13,293
Home mortgages	213	662	1402	1720	2701	4398	9170	9676
Consumer credit	78	323	627	776	1145	1546	2402	2438
Other liabilities	45	98	218	356	575	738	1044	1179
Net Worth	7963	10,719	16,102	19,268	26,626	36,457	53,465	53,626

Source: Federal Reserve Statistical Release Z1, "Flow of Funds Accounts of the United States," various issues. Figures shown are year end, not seasonally adjusted. Some lines include assets and debts of nonprofit organizations.

[1] Measured as annual rate; figure in 1945 column is for 1946.

Table 2. Macro-Economic and Consumer Factors

Macro-Economic Factors

Variable	Definition
CPI	Consumer Price Index
DPI	Disposable Personal Income
DPI/CPI	Real Disposable Income
TBILL6	Short-term Interest Rates, Measured by the Six-Month Treasury Bill Rate
CORPAAA	Long-term Interest Rates, Measured by the Corporate AAA Rate
U	Unemployment Rate
RECYRS	Recession Years
WAR	War Years (Korea, Viet Nam, Iraq)

Consumer Factors

Variable	Definition
CC/CPI	Real Consumer Credit Outstanding, Excluding Mortgage Credit
MC/CPI	Real Mortgage Credit Outstanding, Excluding Consumer Credit
TA/CPI	Real Consumer Sector Total Assets
FA/CPI	Real Consumer Sector Financial Assets
WEALTH/CPI	Real Consumer Sector Total Wealth
TAX86	Represents 1986 Changes in Tax Laws. Variable = 0 before1986; and = 1 after 1986
MICH	Annual Index of Consumer Sentiment, Estimated by the University of Michigan Survey Research Center, Beginning in 1952
FINAS/CPI	Real Consumer Sector Total Financial Assets

Table 3. Income Elasticities of Mortgage and Consumer Credit Growth

Log-linear Mortgage Credit Ordinary Least Squares

Dependent Variable	Intercept	DPI/CPI	CORPAAA	TA/CPI	$\bar{R}^2$/F
MC/CPI	1.5550	0.5447	-0.1144	0.1384	.99
	(1.30)	(5.30)***	(-3.25)**	(2.05)*	19256.

Log-Linear Consumer Credit Two-Stage Least Squares

Dependent Variable	Intercept	DPI/CPI	CORPAAA	U	MC/CPI+	$\bar{R}^2$/F
CC/CPI	-1.6510	0.9728	-0.1056	-0.1068	0.5576	.99
	(-7.12)***	(9.70)***	(-2.80)**	(-3.30)**	(4.33)***	2906.

All variables are expressed in natural logarithms.
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
+ Estimated values from first stage.

Table 4. Business Cycle Periods and Binary Variable Definitions

Date	Period Characterization	Intercept Binary	Slope Binary
1946-1952	post WW II	0	0
1953-1959	Eisenhower years	IV5359	IV5359*DPI
1960-1969	Kennedy-Johnson years	IV6069	IV6069*DPI
1970-1973	Nixon years	IV7073	IV7073*DPI
1974-1979	Ford-Carter	IV7479	IV7479*DPI
1980-1989	Reagan years	IV8089	IV8089*DPI
1990-2000	Bush I-Clinton	IV9000	IV9000*DPI
2001-2006	Bush II	IV0106	IV0106*DPI

Binary variables introduced to models A.1.1 and A.2.1 for successive business cycle expansions. Each binary variable has a value of 1 for the years within the cycle, and 0 otherwise; 1946-1952 are represented by the original intercept and slope.

Table 5. Consumer Credit Log Linear Models With Binary Variables for the 1990s
dependent variable is log(CC/CPI)

Intercept	DPI/CPI	CORPAAA	U	MC/CPI+	IV9000	IV9000 * DPI	$\bar{R}$4F
-1.6618 (-17.22)**	0.9997 (25.03)**	-0.115 (-5.35)**	-0.1253 (-4.63)**	0.5538 (12.40)**	-2.2882 (-3.98)**	0.6144 (3.83)**	.99 2909.
-1.6281 (-10.22)**	0.9839 (14.05)**	-0.114 (-3.91)**	-0.1319 (-4.32)**	0.5794 (6.98)**	-0.0724 (-3.10)*		.99 2841.
-1.627 (-9.97)**	0.9826 (13.68)**	-0.1136 (-3.84)**	-0.1312 (-4.13)**	0.5801 (6.78)**		-0.0195 (-2.96)*	.99 2815.

All variables are expressed in natural logarithms. t-statistics in parentheses

* Statistically significantly different from 0 at the .01 level
** Statistically significantly different from 0 at the .001 level
+ Estimated values from first stage.

AR(1) and AR(2) transformations are applied to each model

For consumer credit, the coefficients of both the intercept (IV9000) and slope (IV9000&DPI) are significantly different from zero. The coefficient of IV9000 is -2.2882 and the coefficient of IV9000*DPI is 0.6144. The intercept for the model is -1.6618 throughout 1946-2006; for 1990-2000 it is -4.5438 (= -1.6618 - 2.2852). The elasticity for consumer credit with respect to disposable income is 0.9997 for 1946-2006 except for 1990-2000 when it is 1.6141 = 0.9997 + 0.6144. In the 1990s consumer credit increased considerably faster than disposable income, holding other factors constant. The income elasticity for 1946-1989 was close to 1.0, supporting the claim that consumer credit that excludes mortgage credit increased at the same rate as disposable income, except for the decade of the 1990s. Much of the consumer credit growth in the 1990s was due to increased use of credit cards, as documented by Johnson (2005).

Table 7. VAREC Model of Credit Growth

Variable	$\Delta \log RCC_t$	$\Delta \log RMC_t$
Constant	-0.8982 (-3.01)	-0.4617 (-3.02)
$\Delta \log RCC_{t-1}$	0.1342 (0.85)	-0.1661 (-2.05)
$\Delta \log RCC_{t-2}$	-0.0649 (-0.46)	0.0488 (0.67)
$\Delta \log RMC_{t-1}$	-0.3073 (-0.90)	0.5627 (3.22)
$\Delta \log RMC_{t-2}$	-0.4634 (-1.54)	-0.3950 (-2.56)
EC_{t-1}	-0.1156 (-3.87)	-0.0584 (-3.81)
ΔlogRDPI	0.3785 (3.88)	0.2063 (4.12)
CORPAAA	-0.0277 (-4.25)	-0.0192 (-5.76)
IV7479	-3.5449 (-2.96)	-1.4044 (-2.29)
IV7479*ΔlogRDPI	1.1296 (2.96)	0.4545 (2.32)
IV8089	0.0818 (2.38)	0.0690 (3.92)
R-square	0.62	0.79

Cointegrating relationship: $EC_t = \log(RCC_t) - 3.7073 + 1.0523 \log(RMC_t)$ t = 2.29.

IV7479 (=1 for 1974–1979, 0 otherwise) IV8089 (=1 for 1980-1989, 0 otherwise)

t-statistics appear in parentheses.

The logRCC and logRMC series are non-stationary but move together as shown by the earlier tests. ΔlogRCC does not have an autoregressive relationship at lags 1 and 2. ΔlogRMC has a positive autoregressive relationship at lag 1, a negative relationship at lag 2, and a significant negative cross correlation with ΔlogRCC at lag 1. Both variables have significant positive relationships with ΔlogRDPI and significant negative relationships with CORPAAA. Two binary variables (IV7479, IV8089, and the interaction IV7479*ΔlogRDPI are important for both ΔlogRCC and ΔlogRMC.

Figure 1. Growth Rates in Consumer and Mortgage Credit

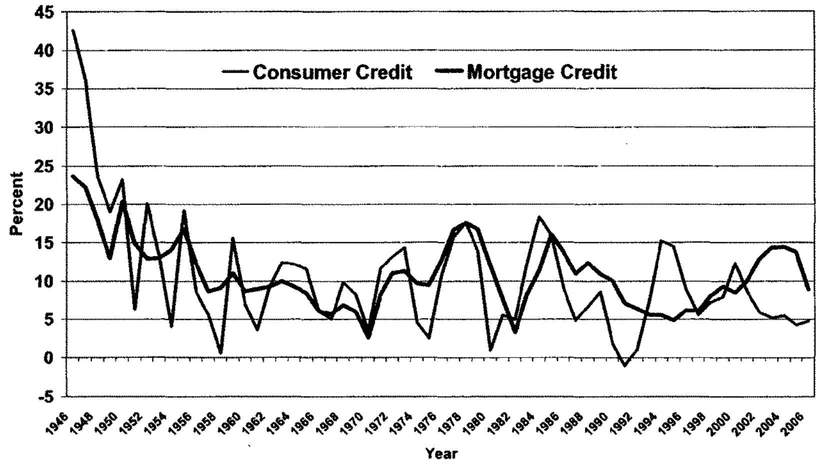

Figure 2. Enthoven's Limit

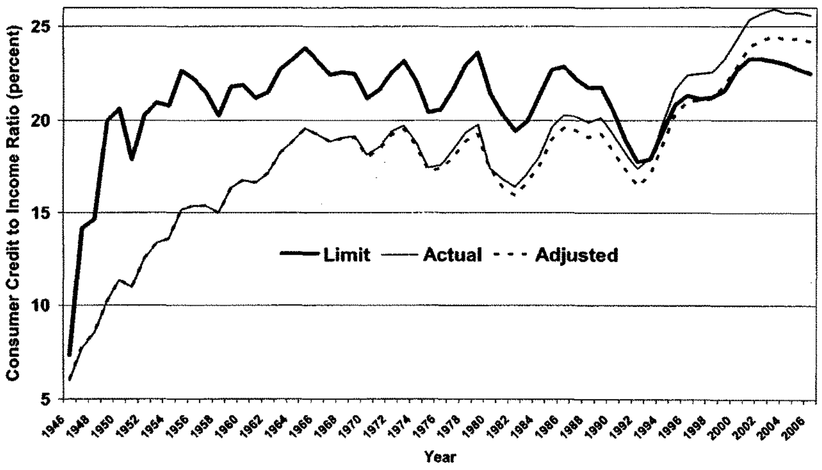

Table A.1. Linear Mortgage Credit OLS Models
Dependent variable is (MC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	TA/CPI	Other
A.1.1	1010.007	0.1636	-0.1262	0.0122	
	(0.01)	(1.98)*	(-2.28)*	(2.07)**	
A.1.2	288,958.30	0.1465		0.0164	0.008 TBILL6
	(0.00)	(1.58)		(2.72)**	(0.22)
A.1.3	1069.355	0.1157	-0.1768		-0.0605 U
	(0.01)	(1.20)	(-3.14)**		(-1.48)
A.1.4	-1.3570	0.1566	-0.1395		0.0096 WEALTH/CPI
	(-0.21)	(1.84)	(-2.44)*		(1.56)
A.1.5	-0.3690	0.1496	-0.1659		-0.0004 FINAS/CPI
	(-0.06)	(1.69)	(-2.90)**		(-0.25)
A.1.6	-1.4276	0.0249	-0.1520		0.2431 LIQASST/CPI
	(0.31)	(0.29)	(-3.01)**		(3.86)*
A.1.7	-1.4240	0.1568	-0.1317	0.0114	0.0248 WAR
	(-0.22)	(1.80)	(-2.29)*	(1.85)	(0.20)
A.1.8	236,569.8	0.1594	-0.1252	0.0119	-0.0301 TAX86
	(0.00)	(1.89)	(-2.19)*	(2.04)*	(-0.11)
A.1.9	-0.9750	0.1530	-0.1321	0.0113	0.0012 MICH
	(-0.13)	(1.42)	(-2.14)*	(1.68)	(0.18)
A.1.10	-1.5582	0.1333	-0.1196	0.0116	-0.0583 RECYRS
	(-0.22)	(1.53)	(-2.05)*	(1.93)	(-0.91)

t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.2. Linear Consumer Credit Two-Stage Least Squares Models
dependent variable is (CC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	U	MC/CPI	Other
A.2.1	-0.3891	0.2108	-0.068	-0.0518	0.0668	
	(-1.22)	(9.09)***	(-2.80)**	(-3.04)**	(3.01)**	
A.2.2	-0.4532	0.1861		-0.0561	0.0862	-0.0119 TBILL6
	(-1.30)	(7.86)***		(-2.54)**	(3.69)***	(-0.61)
A.2.3	-0.3507	0.2136	-0.0697	-0.0511	0.0724	-0.0012 TA/CPI
	(-1.07)	(8.78)***	(-2.80)**	(-2.96)**	(2.69)**	(-0.40)
A.2.4	-0.3271	0.2141	-0.0702	-0.0505	0.0744	-0.0019 WEALTH/CPI
	(-0.99)	(8.99)***	(-2.85)**	(-2.94)**	(-2.88)**	(-0.63)
A.2.5	-0.3967	0.2117	-0.0677	-0.0522	0.0651	0.0002 FINAS/CPI
	(-1.24)	(8.96)***	(-2.76)**	(-3.03)**	(2.79)**	(0.30)
A.2.6	-0.4263	0.1839	-0.0698	-0.0537	0.0650	0.0292 LIQUASST/CPI
	(-1.22)	(5.10)***	(-2.86)**	(-3.17)**	(2.79)**	(1.02)
A.2.7	-0.4041	0.2122	-0.0677	-0.0522	0.0656	0.0218 WAR
	(-1.27)	(8.96)***	(-2.77)**	(-3.03)**	(2.89)**	(0.37)
A.2.8	-0.3758	0.2108	-0.0686	-0.0518	0.0663	0.0179 TAX86
	(-1.18)	(8.99)***	(-2.74)**	(-3.01)**	(2.91)**	(0.14)
A.2.9	0.0413	0.2045	-0.0734	-0.0690	0.0702	-0.0016 MICH
	(0.10)	(8.47)***	(-2.96)**	(-3.69)***	(3.05)**	(0.62)
A.2.10	-0.3757	0.2091	-0.0663	-0.0509	0.0683	-0.0066 RECYRS
	(-1.19)	(8.47)***	(-2.57)**	(-2.88)**	(2.91)**	(-0.20)

* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.3. Log-linear Mortgage Credit OLS Models
dependent variable is log(MC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	TA/CPI	Other
A.3.1	1.5550	0.5447	-0.1144	0.1384	
	(1.30)	(5.30)***	(-3.25)**	(2.05)*	
A.3.2	0.9877	0.4826		0.2342	0.0011 TBILL6
	(0.72)	(3.92)***		(3.37)***	(0.10)
A.3.3	3.2682	0.6914	-0.1498		-0.0188 U
	(0.75)	(4.73)***	(-4.50)***		(-1.17)
A.3.4	1.8219	0.5653	-0.1232		0.0928 WEALTH/CPI
	(1.46)	(5.49)***	(-3.48)***		(1.53)
A.3.5	2.3750	0.5970	-0.1459		-0.0011 FINAS/CPI
	(1.85)	(5.80)***	(-4.36)***		(-0.24)
A.3.6	1.5537	0.5654	-0.1088	0.1318	0.0102 WAR
	(1.20)	(5.47)***	(-3.09)**	(1.97)*	(1.23)
A.3.7	1.5048	0.5502	-0.1171	0.1386	0.0074 TAX86
	(1.28)	(5.26)***	(-3.24)**	(2.04)*	(0.39)
A.3.8	6.2981	0.5533	-0.1057	0.0847	0.0004 MICH
	(0.23)	(3.46)***	(-3.07)**	(1.25)	(1.00)
A.3.9	1.8788	0.5038	-0.1003	0.123	-0.0090 RECYRS
	(1.35)	(5.08)**	(-2.96)**	(1.91)	(-2.32)*

All variables are expressed in natural logarithms.
t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.4. Log-Linear Consumer Credit Two-Stage Least Squares Models
dependent variable is log(CC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	U	MC/CPI	Other
A.4.1	-1.6510	0.9728	-0.1056	-0.1068	0.5576	
	(-7.12)***	(9.70)***	(-2.80)**	(-3.30)**	(4.33)***	
A.4.2	-2.4366	1.4961	-0.1694	-0.0905	-0.1129 lag	
	(-5.65)***	(9.84)***	(-2.98)**	(-3.18)**	(-1.33)	
A.4.3	-2.4220	1.2847		-0.0949	0.0231	-0.0110 TBILL6
	(-5.60)***	(5.91)***		(-2.30)*	(0.18)	(-0.47)
A.4.4	-2.6372	1.4829	-0.1708	-0.0887	-0.1248	0.0547 TA/CPI
	(-4.61)***	(6.23)***	(-2.64)**	(-3.07)**	(-0.94)	(0.39)
A.4.5	-2.5439	1.5293	-0.1775	-0.0879	-0.1156	0.0036 FINAS/CPI
	(-5.34)***	(6.84)***	(-2.89)**	(-3.05)**	(-0.92)	(0.34)
A.4.6	-2.5233	1.5166	-0.1781	-0.0879	-0.1091	0.0044 WEALTH/CPI
	(-4.59)***	(6.52)***	(-2.78)**	(-3.03)**	(-0.84)	(0.04)
A.4.7	-2.5273	1.5229	-0.1757	-0.0874	-0.1101	0.0043 WAR
	(-5.38)***	(6.89)***	(-2.80)**	(-3.04)**	(-0.89)	(0.25)
A.4.8	-2.1616	1.3315	-0.1412	-0.1316	-0.0074	-0.0001 MICH
	(-7.53)***	(7.56)***	(-2.95)**	(-5.61)***	(-0.07)	(-0.21)
A.4.9	-2.5260	1.5180	-0.1771	-0.0884	-0.1002	-0.0128 TAX86
	(-5.47)***	(6.94)***	(-2.88)**	(-3.07)**	(-0.81)	(-0.34)
A.4.10	-2.4884	1.4953	-0.1707	0.0860	-0.0945	-0.003 RECYRS
	(-5.24)***	(6.36)***	(-2.56)**	(-2.93)**	(-0.72)	(-0.30)

All variables are expressed in natural logarithms. Levels of consumer credit and mortgage credit may influence each other. New home owners may need additional consumer credit to purchase the essentials to settle into the abode. Increasing consumer credit will deter mortgage lenders from offering new mortgage credit. Thus, consumer credit models should be estimated as two stage least squares models.

t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level

The R-square for each model is 0.98. AR(1) and AR(2) transformations are applied to each model.

IMPACTS OF TARP ON FINANCIAL INSTITUTIONS

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IMPACTS OF TARP ON FINANCIAL INSTITUTIONS

ABSTRACT

Insolvency for any of the four largest U.S. commercial banks during the 2009 financial crisis could have virtually destroyed the U.S. financial system and would have had serious detrimental effects on global financial markets. There was really no alternative but for the U.S. Treasury to implement the TARP program and to modify the initial plans from purchasing toxic bank assets to injecting capital with the government becoming a senior preferred stockholder. This study provides models of bank stress tests using publicly available data to show the vulnerability of the four largest banks. The consistency between the results in this study and the confidential Federal Reserve Supervisory Capital Assessment Program shows the effectiveness of the models developed here, although the goals of the two analyses were different. The TARP program restored confidence in the U.S. financial system and should be deemed successful. An important result of this study is to promote debate of policy alternatives to avoid the necessity for a future TARP capital injection.

I. INTRODUCTION

The Troubled Asset Relief Program (TARP) was introduced with a September 2008 proposal by U. S. Treasury Secretary Henry Paulson, rejected by the House of Representatives on September 29, and then enacted as part of the Emergency Economic Stabilization Act of 2008 on October 3, 2008. The most important result was for the Federal government to inject $239.5 billion of capital into numerous financial services firms' balance sheets. Now is a good time to model the program's effects on the recipient firms, to consider the public policy implications if TARP had not been implemented, and to review what policy options might avoid the necessity for a similar program in the future. The study examines March 31, 2009 data to model the impacts of TARP on the solvency of banks to reflect the environment shortly after they received capital injections.

Background

TARP has been a historic experience in public sector financial management that has and will have implications for domestic and global finance. This public sector investment has already increased the 2010 fiscal deficit by almost a trillion dollars to an aggregate debt level of almost $14 trillion. At an average long run interest rate of 5 percent, the $700 billion annual cost of financing this additional debt is more than 60 percent of all U.S. federal government annual individual plus corporate income tax receipts. Some TARP funds will never be repaid and the current repayments are being allocated to other public sector programs to try to reduce unemployment, rather than paying off the additional debt incurred to fund TARP. Current projections of the aggregate TARP losses are approximately $117 billion (Fitzpatrick, 2010). These public costs invite vigorous debate, as to whether the TARP expenditures were in the long run public interest, even from those who agreed with necessity of TARP in the short run.

TARP was originally conceived for the U.S. Treasury to purchase toxic assets from financial services firms, providing liquidity for loans to the private sector and stimulating the U.S. economy. The original plan required valuing the bundle of assets the government would have acquired from each institution, which would have been nearly impossible. Valuing individual loan portfolios of the 20 largest financial services firms would have required months of analysis for a large team of experts, an impractical endeavor for US financial regulators.

Thus, the U.S. Treasury chose to employ the TARP funds to acquire preferred stock in approved institutions (mostly large) with an initial 5 percent dividend for the federal government. This investment was deemed to be acceptable for the public sector with the expectation that the capital injection to the right hand side of the institutions' balance sheets would be matched with bank business loans that were expected to stimulate the economy. At the same time, however, the institutions were being warned by their financial regulators to reduce, or at least not increase, the riskiness of their asset portfolios.

Economic Environment of the Financial Crisis

Some of the initial positive impacts of TARP have become evident. The advanced 2009 fourth quarter estimate of GDP growth is reported to be 5.7 percent, of which only 2.3 percent was real growth without inventory adjustments (*Wall Street Journal*, January 30, 2010). For the third quarter of 2009, the preliminary release of real GDP growth was 3.8 percent, which has now been revised downward to only 2.2 percent, so major revisions in the fourth quarter report would not be surprising. Forecasts of highly regarded economists who participated in the February 2010 surveys by the Federal Reserve Bank of Philadelphia (2010) and The Economist (2010) both predict real GDP growth of 3.0 percent for 2010, following negative real growth of 2.4 percent for 2009.

The financial markets, represented by recent stock indices, are signaling some economic progress. Between March 31, 2009 and March 1, 2010, the Dow Jones Industrial Average rose approximately 37 percent from 7,609 to 10,404 and for the four largest banks – J P Morgan Chase, Bank of America, Wells Fargo (after acquiring Wachovia), and Citigroup - their March 1, 2010 vs. March 30, 2009 share prices are: $41.83 vs. $24.85; $16.71 vs. $6.03; $27.35 vs. $13.37; and $3.39 vs. $2.31; respectively.

This Study

The empirical focus of this study is to model stress tests -- as potential asset losses -- applied to major balance sheet items of the four largest banks considered to be "Too Big To Fail".[1] These four banks dominate the U.S. banking system as sources of short-term capital and represent almost 40 percent of American total bank assets. Two additional banks, among 23 TARP banks that have the highest ratios of the particular asset to net loans, are also stress tested for each asset. The 23 banks are those that received at least $1 billion of capital injections.

The assets modeled for the stress tests were those at the greatest risk during the dramatic 2008-2009 deterioration of the U.S. financial markets. The tests are for potential asset losses for the banks' (i) real estate loans, (ii) other loans, (iii) credit card loans, and (iv) off-balance sheet securitized assets. The results are contrasted with the May 2009 Federal Reserve Capital Assessment Program tests and found to be consistent.

Section II delineates the international capital regulatory environment in which the TARP banks operate. Details of the TARP injections and the financial characteristics of the 23 TARP institutions are delineated in Section III. Section IV describes the method the authors have constructed to model the potential stress on the TARP institutions. Section V provides the models and results of the unique stress tests for four asset categories applied to six banks and compared to the results from the Federal Reserve Capital Assessment Program. The conclusions about the importance of TARP follow in Section VI, which includes a discussion of potential policy recommendations to avoid the need for a future TARP injection.

II. INTERNATIONAL BANK CAPITAL

In the early 1980s, the Federal Reserve and the Bank of England began coordinating some bank capital requirements for the large banks and bank holding companies they supervised. By 1986 the Bank of International settlements in Basel, Switzerland accepted the leadership of the effort and rapidly gained participation of nine countries to accept the proposed Basel 1 capital requirements. (Details on Basel 1 and Basel 2 can be found in Gup, 2004, and Bank for International Settlements, 2004 and 2006). Within a few years, successful implementation of Basel 1 included acceptance of the standard by the World Bank, the International Monetary Fund, and the European Union for their nearly 200 member countries.

Basel 1 Requirements

Basel 1 requirements were based on a bank's book value of total assets, risk adjusted assets, and components of its capital accounts. Some flexibility in the requirements encouraged a wide range of central banks and financial regulators to implement the system.

Risk adjusted assets are the product of the book value of assets in an asset risk category and the weight assigned to that category, cumulated across the four categories: 0% is assigned to cash and various claims on central governments; 20% to securitized mortgages, mortgage backed securities, Federal funds sold, cash items in collection, and Municipal securities; 50% to conventional mortgages and securitized assets other than mortgages; and 100% to unsecuritized loans, industrial revenue bonds, other assets, and fixed assets.

Tier I, or core capital includes common stock, retained earnings, preferred stock with noncumulative dividends, minus goodwill. Tier II capital includes preferred stock with cumulative dividends, loan loss reserves, and capital debentures with at least five year maturities.

Basel 1 required banks to maintain:

(1) total capital as a ratio to total assets of 6 percent

(2) Tier I Capital > 4 percent of Risk Adjusted Assets, and

(3) (Tier I + Tier II) Capital > 8 percent of Risk Adjusted Assets.

Basel 2 Requirements

After approximately a decade, it appeared that more sophisticated requirements should be implemented for the 21st century. After much discussion and analysis, the Bank for International Settlements issued Basel 2 for comment by member countries and their financial regulators.

Basel 2 creates international standards for how much capital banks must retain to mitigate their financial and operational risks. Basel 2 continued Tier I and Tier I plus Tier II capital requirements as percentages of Risk Adjusted Assets and augments risk-weights assigned to asset classes according to their risk *potential.* In addition, to the four asset categories in Basel 1, Basel 2 includes derivative products weighted at 125 percent and off-balance sheet items weighted at 150 percent of their book values.

Basel 2 (Pillar III) also required each institution to develop its own internal risk profile and introduced more regulatory procedures for banks' disclosure of their capital structure.[2] These provisions attempted to increase the effectiveness of Basel 2, requiring bank holding companies to operate according to their risk profile. As market values of risky assets (such as mortgage loans, CMOs, and MBSs) declined, regulators expected institutions to increase their Tier I core capital.

Basel 2 capital requirements could have exacerbated reaction to the financial crisis and public policies as an unintended consequence. The institutions should have increased their Tier I capital for safety and soundness at a time when their asset values were declining. Raising new capital was hardly possible during the crisis. For institutions with negative net incomes, retained earnings were reduced by the amount of these losses.

The policy conflict was that banks needed additional capital and regulators might have encouraged banks to seek it for safety and soundness while capital markets were hardly operating. This policy conflict was not anticipated because Basel 2 focuses on GAAP accounting and book values of bank assets and capital. Basel 2 bank capital requirements were supposed to enhance capital cushions, but the magnitude of the financial crisis was beyond the regulators perspective when Basel 2 was devised. Some approaches for dealing with these conflicts are suggested among the conclusions to the paper.

Potential policy unintended consequences often occur from the best intentions. The FDIC is proposing (Adler, 2010) that banks commit to a minimum one year holding period for most securitized assets. This would damage secondary markets and discourage what were designed as the main benefits of asset securitization – enhancing bank liquidity in place of holding illiquid assets and expanding credit availability.

Some banks became so conservative that they have been properly accused of not serving their borrower communities. They hardly loaned much, if any, of their TARP capital injections. For the 23 TARP banks analyzed in this study, their ratio of net loans to assets for March 31, 2009 was 54.51 percent, 2.28 percentage points below the ratio one year before.

The Basel 2 provisions that are directly relevant for the models in this study are:

(1) total capital as a ratio to total assets of 6 percent

(2) Tier I Capital > 6% of Risk Adjusted Assets

(3) (Tier I + Tier II) Capital > 10% of Risk Adjusted Assets

(4) Tier II Capital < Tier I Capital

(5) off balance sheet securitized assets, derivative products, and off-balance sheet items included as additional components of Risk Adjusted Assets

(5) internal based risk analysis (Pillar III) for each bank

Toxic Assets, Capital Levels, and Costs of Capital

Some of the most toxic assets the institutions held in 2008 were collateralized mortgage obligations (CMOs) and mortgage backed securities (MBSs) linked to real estate loans. Often the book values of these assets far exceeded their market values. Excessive, subprime mortgage loans, sometimes including closing costs, had been committed on inflated "hypothesized" property values to customers with modest incomes. Credit rating agencies underestimated the risk and overestimated or overstated values of securitized assets that supported the real estate loans. Borrowers and lenders often operated under the false premise that real estate values would rise continually so that refinancing more "valuable" property after two or three years would not be difficult, and the new interest rate would be similar to the original mortgage rate.[3]

Flannery (2006, Table 5) calculates the low Basel 2 risk weights for senior AAA claims. His "Table 5 indicates that a AAA senior claim on a diversified loan portfolio will have a risk weight of 7 percent under Basel II" (Flannery 2006, page 26)

In fact, real estate market values declined below book values and many borrowers defaulted on their mortgages, leaving the market value of institutions' asset portfolios well below their book values. With the deterioration of the value of their loan portfolios, banks' retained earnings and Tier I capital declined by the amount of the losses. Annual net income losses further reduced banks' Tier I capital.

Federally insured financial service firms with high leverage (typically debt to equity ratios of 10 to 1) were convinced that their marginal cost of equity was considerably greater than their cost of debt. The cost of the debt was considerably less than its real cost because so much debt was comprised of deposits insured by the public sector, and banks benefitted from the public guarantees and moral hazard.

III. THE TARP PROGRAM AND ITS BANKS

TARP

The TARP program was implemented to protect both the American and global banking systems during the financial crisis. The TARP approach that was implemented continues to be a source of controversy, however, one large American bank failure among the four largest would have been disastrous. Many early TARP opponents are now less vigorous in their objections.

An interesting public finance aspect of TARP, which has hardly been discussed, is the large spread between the dividend rate on the preferred stock TARP injections and the Treasury's low cost of funds. Interest rates on six-month Treasury bills since January 2009 have been below 45 basis points (Federal Reserve Bank of St. Louis, FRED2). TARP injections require the recipient bank to pay at least a 5 percent annual dividend; and there were other risk protections for the Treasury. Thus, it is not surprising that financially sound institutions were determined to repay the funds as soon as the Federal Reserve completed its Capital Assessment Program tests in May 2009 (Board of Governors of the Federal Reserve, 2009).

TARP Institutions

Eighteen commercial banks received a total of $188.5 billion in TARP funds. Two investment banks (Morgan Stanley and Goldman Sachs) each received $10 billion, after converting to financial holding companies, and accepting some Federal Reserve regulation. In addition, CIT received $2.3 billion, and Discover Financial Services received $1.2 billion.

Table 1 delineates the characteristics of the 23 institutions that received 88.5 percent of the TARP banking funds and at least a $1 billion injection. 58.5 percent of the total TARP capital injections went to the four largest commercial banks -- Citigroup (18.8%), Bank of America (18.8%), Wells Fargo (10.4%), and J P Morgan Chase (10.4%). The first data column of Table 1A shows the amount of TARP funds that each institution received. A star denotes that the funds were repaid to the U. S. Treasury in June, 2009, immediately following the Federal Reserve's Capital Assessment Program tests. Of the total TARP dollar injections to all institutions, 72.2 percent were repaid by March 1, 2010 (www.treas.gov).

Data and Measures

Public data from the FDIC web site (www.fdic.gov) allow calculations of the 23 TARP banks' risk adjusted assets (RAA), solving for RAA from the FDIC's ratio of Tier I Capital/RAA and the level of Tier I Capital. For the TARP banks, the three loan assets to be stress tested represent 47 percent of these banks total assets, and securitized assets represent an additional 22 percent of the banks' assets.

Tables 1A and 1B summarize the March 31, 2009 financial characteristics of the 23 TARP banks. Table 1A provides balance sheet data. Table 1B provides ratios to reflect the riskiness of the banks' loan portfolios, relative to their capital. Means and standard deviations are provided at the bottom of Table 1A. The standard deviation is larger than the mean for each item in Table 1A, demonstrating the spectrum of risk among the insured depository institutions.

The three banks at the bottom of Table 1A – Huntington BancShare, Zions BanCorporation, and Discover Financial Services – may not appear to have needed TARP funds because their March 2009 Tier I capital ratios were 7.73 percent, 34.95 percent, and 15.21 percent, respectively. However, each of the three was already in precarious financial position by March, 2009, or shortly thereafter. Zions had negative net income and almost 9 times its total capital in real estate loans. Huntington BancShare had 99 percent of its loans in real estate and its ratio of real estate loans to total capital was 341 percent. Discover had 98 percent of its loans in credit card loans, and its ratio of credit card loans to total capital was 512 percent. Moreover, Discover, faced 7 times as much risk in off-balance sheet (unused) credit card loan potential obligations ($187 billion) as its credit card loans outstanding ($25.6 billion).

IV. MODELING TARP INSTITUTIONS' STRESS

The Assets

Impacts of the TARP injections are modeled for four bank assets, representing 69 percent of the total assets for the four largest U.S. banks, plus two additional banks. The assets are:

(1) Real estate loans

(2) Other loans

(3) Credit Card, and

(4) Off balance sheet securitized assets

Real estate loans include 1-4 family residential real estate loans, multifamily residential real estate loans, construction and development loans, and commercial real estate loans. For all 7,038 U.S. banks, as well as the 533 with assets above $1 billion, approximately two-thirds of their real estate loans are residential, and 22 percent are commercial real estate loans. The composition of other loans is 60.25 percent in business loans, with the remainder comprised of personal loans, agricultural loans, loans to financial institutions, broker and dealer loans, and loans to government agencies.

Credit card loans are distinct, unsecured personal loans, which are especially risky during a recession. The off-balance sheet balances are often borrowed by persons who are in the most difficult economic circumstances. In March 2009, the off-balance sheet unused credit card commitments for the TARP banks were 2.4 times their outstanding credit card loan balances. The four largest banks assets' in credit card loans are much smaller than their real estate loans, other loans, or securitized assets. 16 of the 23 TARP borrowers had less than one percent of their net loans in credit card loans. However, Discover Financial Services had 98 percent of its net loans as credit card loans.

The 23 banks' securitized assets represent 17.6 percent of their total assets, but only six have more than $10 billion in securitized assets. Modeling securitized assets is particularly important because new accounting requirements demand that banks report securitized assets within their balance sheets.

Derivatives are an important off-balance sheet bank asset, but the reported notional dollars on the FDIC reports of condition probably overstates their economic value and potential risk to the bank. To determine their appropriate risk you need a net value against forward positions that are not recorded on the FDIC statements. Therefore, the TARP banks' derivatives are not analyzed here.

The Banks

Stress tests are applied to six banks for each of the four assets. The four largest banks, which comprised $4.5 trillion of the aggregate $12 trillion total U.S. bank assets, as of March 31, 2009, are stress tested for each asset. Two smaller banks are examined because they have the largest amount of their assets at risk in a particular asset category. For real estate loans the two additional banks are: HuntingtonBancShares with 99.1 percent of their net loans in real estate loans and Zions BanCorporation with 75.4 percent of their net loans in real estate loans. CIT and State Street Bank had 99.9 and 95.9 percent of their net loans in other loans, respectively.

Stress tests for two additional banks, beyond the four largest banks, include highly vulnerable institutions. Stress testing business loans for CIT, for example, is critical, but less than one percent of its loans are supported by real estate. The investment banks that obtained TARP funds are not stress tested because they have virtually no insured deposits, a different asset composition from commercial banks, and a different role in the economy. Also, they operate in a somewhat different regulatory environment than insured depository institutions, although they converted to financial holding companies to access TARP funds.

V. APPLYING THE STRESS TESTS

For each of the four asset stress tests, it is assumed that either 10 percent or 20 percent of a particular bank's assets in that category could be lost. These are rather small percentage loss assumptions for the banks considering the magnitude of the financial crisis. Book value assets are reduced by the hypothesized loss, loan loss expenses increase, and capital is reduced by the same amount. The high likelihoods of at least these percentage losses without TARP are illustrated by the institutions' 2009 balance sheets.

The results of the asset stress tests and models are reported in Tables 2A-2D and Table 3. Each portion of Table 2 presents the impact on one of the four largest banks. Since each asset test is sequential, the aggregate effect for each bank is sum of the four tests. Table 3 provides the impacts for two smaller banks, labeled Bank 1 and Bank 2 in the table.

Tables 2 and 3 model the stress on a bank's total assets, Tier I Capital as a ratio to Risk Adjusted Assets, and the Total Capital-Total Asset Ratio. The *actual* column represents a bank's March 31, 2009 position and the *scenario* column is the result after applying the "stress" (losing

10 or 20 percent of funds in an asset category). The data in Tables 2 and 3 represent the circumstances approximately five months after the TARP injections. Without the TARP funds, these banks' the financial characteristics as of March 2009 would not be so acceptable as those delineated in Tables 1A and 1B.

Citigroup (Table 2A)

If Citigroup were to lose 10 percent of its real estate loans, other loans, or securitized assets, the bank's capital-asset ratio would decline to 7.46%, 7.42 %, or 4.96%, respectively. Such losses on real estate or other loans reduce Citigroup's Tier I Capital ratio (Tier I Capital/RAA) to slightly below 8 percent, which does not violate Basel 2 requirements. A 20 percent loss of Citigroup's securitized assets would be disastrous. Its Total Capital-Total Asset ratio would become 0.36 percent and its Tier I Capital – Risk Adjusted Asset ratio would become -0.97 percent. A 10 or 20 percent loss of its Credit Card Loans hardly affects Citibank's capital position, but the bank has three times as much in off-balance sheet credit card potential loans, at customers' discretion, than credit card loans outstanding.

The conclusion for the Citigroup stress tests is that any substantial additional losses among its real estate loans, other loans, or securitized assets after March 31, 2009 would have endangered its balance sheet. Without the TARP injections, Citigroup would have been in more difficulty than it has experienced. For those who accept efficient share price markets, Citigroup's share price near $1 in March 2009 reflected market expectations.

Bank of America (Table 2B)

The 2009 Bank of America (BofA) financial position is partially the result of their numerous acquisitions in the past decade. After merging with NationsBank and re-locating its headquarters to Charlotte, North Carolina in 1997, BofA completed acquisitions of MBNA (a highly profitable Delaware credit card bank) in June, 2005, Countrywide (a mortgage lender) in July, 2008, and Merrill Lynch (the nation's largest retail brokerage firm) in March, 2009. The resulting institution is a very different financial services firm from the one that had developed in California as a west coast regional lender with a great deal of credit card activity.[4]

The impacts of potential real estate loan losses or other loan losses for BofA would be serious and not dissimilar to the same percentage losses for Citigroup. 10 and 20 percent real estate loan or other loan losses for BofA would reduce the Bank's Tier I Capital and Capital - Asset ratios to levels of concern and below even the Basel I requirements.

The impacts of potential credit card loan losses would not appear to be serious for BofA. However, after the acquisition of MBNA, BofA's credit card loans represent 8.9 percent of its loan portfolio. BofA held securitized assets of only 4 percent of total assets in March of 2009. Therefore, a deterioration of these assets would not have seriously impaired the bank's capital.

JPM (Table 2C)

J P Morgan Chase (JPM) is the result of Jamie Dimon's successful acquisitions when he was President of Chicago First National Bank and his return to New York, where he had previously been denied in his quest to become President of Citibank. In Chicago, under the name of BancOne, Dimon combined BancOne, previously headquartered in Columbus, Ohio; Chicago First National Bank; and the National Bank of Detroit, Michigan. Upon his return to New York, he merged BancOne into J P Morgan in July of 2004 and then acquired Chase Manhattan Bank in 2008 to form JPM Chase. JPM Chase had done due diligence for a possible acquisition of Bear Stearns in 2008, and when Bear Stearns was failing in March 2009, JPM Chase was the preferred emergency acquirer at a very low price.

JPM could not have withstood significant losses to its real estate loans, other loans, or securitized assets without impairing its capital position. A 20 percent loss to any of these three assets would have reduced JPM's Capital - Asset ratio and Tier I Capital to Risk Adjusted Assets ratios below the Basel 2 requirement.

Wells Fargo (Table 2D)

Wells Fargo was in a different position from the other three large banks. During the financial crisis, Wells Fargo agreed to acquire Wachovia Bank on October 3, 2008 and to accept the associated risks. As part of the acquisition, Secretary Paulson extended an unusual tax provision to Wells Fargo. Instead of the usual merger allowance to exempt $1 billion from taxable profits annually for 20 years, Secretary Paulson committed the Internal Revenue Service, as part of the U.S. Treasury, to exempt $20 billion of profits from taxable income as Wells Fargo would choose to apply the exemption. This immediate potential exemption almost doubles the present value of the $20 billion exemption and greatly increased the long run value of the acquisition.

The results of the stress tests for Wells Fargo are not very different from those for Citigroup. A 10 percent Wells Fargo asset loss in real estate loans, other loans, or securitized assets would leave Wells Fargo with unacceptable Tier I and total capital positions. As a result of any of the three prospective 10 percent losses, the bank's Tier I Capital – Risk Adjusted Asset ratio would be below 5 percent, and its largest Capital - Asset ratio would be below 6 percent. In each instance a Basel 2 requirement would be violated. If the loan loss ratios were 20 percent, Wells Fargo would have miniscule capital positions. Only the bank's credit card loan portfolio appears to be capable of sustaining a 10 or 20 percent loss.

Bank 1 and Bank 2 (Table 3)

Table 3 provides results comparable to Tables 2A – 2D for two additional banks. Bank 1 and Bank 2 will be different institutions for each asset category. Banks 1 and 2 are the two banks with the highest percent of their net loans in the particular asset category being examined.

Huntington BancShares and Zions Bancorporation each had more than 250 percent of its capital in real estate loans (see Table 1) in March 2009. For 10 or 20 percent real estate loan losses, the capital position for Huntington BancShares would be damaged, and Zions Bancorporation's capital would be severely impaired.

Discover Financial Services is the only institution among the TARP banks for which credit card losses might have threatened their solvency. Some of the four largest banks have significant credit card activity, but they were probably large enough to withstand major credit card losses.

Other loans, including commercial and personal loans (unrelated to credit cards) are critical assets for CIT, as a predominantly small business lender. CIT was unable to sustain major loan losses and their creditors nearly foreclosed in August 2009, three months before the bank entered bankruptcy. CIT's capital-asset ratio would have been greatly impaired by a 10 or 20 percent loss of its other loans, which include business loans.

Aggregate Asset and Capital Losses

The scenarios for the assets of the four largest banks can be aggregated since each bank is stress tested independently for each asset. The impacts of combined losses of 20 percent of real estate loans and other loans for the large banks are shown in Table 4.

The conclusion is clear. On the basis of March 31, 2009 data, each of the four largest

U. S. banks would have been in a precarious capital position if the bank had lost 20 percent of *each* of the four assets that are stress tested. After the 20 percent losses, the *largest* values of Tier I Capital/Risk Adjusted Assets (0.27 percent) and Total Capital/Total Assets (1.09 percent) would have belonged to Citigroup.

Modeling 20 percent losses is not unrealistic. Between March 31, 2008 and the same date in 2009, the Dow Jones Industrial Average declined 38 percent (from 12,263 to 7,609), unemployment rose from 5.0 to 8.9 percent, and housing foreclosures increased even more rapidly. These economic experiences are evidence that the percentage of losses analyzed in this paper were realistic concerns for the U.S. financial system.

Stress Tests vs. the Fed Capital Assessment Program

The scenarios that have been developed in this study are quite similar to the Supervisory Capital Assessment tests that were applied in the spring of 2009 by the Board of Governors of the Federal Reserve (2009a) and summarized by Chairman Bernanke (2009). Each emphasizes the ratio of total capital to total assets and the composition of capital (tier I capital as a ratio to risk-adjusted assets) to examine the riskiness of the TARP banks. The Federal Reserve employed the tests to examine the additional capital injection that might be needed for the banks to remain solvent if the economy deteriorated further. The Federal Reserve tests were completed just before some TARP banks were permitted to repay their "loans" in June. On November 9, 2009 the Fed (Board of Governors, 2009b) announced that 9 of the 10 bank holding companies that had been determined to need capital in May 2009 were in now compliance.

The similarity between the results of this study and the Fed's tests reflects the effective modeling applied here, even though the purposes of the two approaches are different. This study shows how important the TARP program was to support the institutions during the financial crisis. Bernanke (2009) says the Fed's "assessment program was a forward-looking, 'what-if' exercise intended to help supervisors gauge the extent of the additional capital buffer to keep these institutions strongly capitalized and lending, even if the economy performs worse than expected between now and the end of next year."

VI. CONCLUSIONS AND POLICY CONSIDERATIONS

TARP Results

The four largest US banks had combined total assets of $4.8 trillion on March 31, 2009. If all four had failed and the U.S. government realized 50 percent of the book value of their assets, the loss to taxpayers would have exceeded $2 trillion. Instead, TARP injected $239.5 billion into approximately 35 financial institutions; $212 billion was injected into the 23 institutions in Table 1, earning approximately a 5 percent dividend. Virtually the total injection will be repaid by 2012. 72 percent of the total TARP injection has been repaid by March 2010. For 2009, the Treasury's TARP revenue from the 23 institutions with a 5 percent preferred stock dividend should have exceeded $10 billion, while the six-month Treasury bill rate was always below one half of one percent.

The failure of even the smallest of the four largest commercial banks could have virtually destroyed the U.S. financial system and would have had global implications. There was really no alternative but for the U.S. Treasury to implement the TARP program. Even the delayed bankruptcy filing by CIT and reorganization while they continued lending to small firms, instead of their bankruptcy during the height of the crisis, should be viewed as a benefit of TARP.

The TARP program restored confidence in the U.S. financial system, as proved by the market results since March 2009. March 2009 data include the immediate impacts of TARP and reflect what could have occurred without the capital injection. TARP should be deemed a success by virtually any standard.

Avoiding the Need for Another TARP

A number of suggestions are being offered to avoid the need for future TARP injections. A combination of these approaches can be the basis for a policy solution.

Flannery (2005) offered one of the few suggestions shortly before the financial crisis. He proposed that financial institutions be required to hold reverse convertible debentures that would be automatically converted to core capital if the *market* value of an institution's capital fell below a pre-established threshold. Flannery (2010) has expanded his analysis and retitled his debentures as contingency capital certificates (CCC), which would provide a safety net to large financial institutions without public sector capital injections. Flannery would require CCCs to be held as bank debt that would automatically convert to core capital on the basis of declining market values of bank equity, without regulatory intervention or legislative action.

Kashyap, Rajan, and Stein (2008) recommend that depository institutions be required to purchase capital insurance from which they would receive a capital infusion in a crisis. This proposal has some similar aspects to what Flannery has proposed, but capital infusions from insurance would require cooperation and possibly negotiation between the crisis institution and the insurance company. Moreover, if the same company insured numerous banking institutions during a crisis similar to 2008-2009, the insurance company or industry would probably require public sector assistance.

Paul Volker, advisor to President Obama, former Federal Reserve Chairman, and former President of the New York Federal Reserve Bank, has proposed an approach (2010) that is a partial return to 1933 Glass-Steagall requirements that were eliminated by the Financial Modernization Act of 1999. Volker would require that institutions eligible for public sector financial support separate their activities between those on behalf of their customers and those on behalf of the institution and its owners. Volker's proposal would separate proprietary trading, hedge funds activity, and equity trading and not provide public financial support for these activities if they faced substantial losses.

Others have recommended substantially increased capital requirements for institutions so that they could sustain losses in a crisis and remain solvent. For example, an institution might be required to have a 10 percent ratio of core capital to risk adjusted assets, which would be permitted to decline to 8 percent if the market value of a bank's assets deteriorated in a crisis. With an 8 percent capital ratio, an institution could continue to function, but further losses would put the institution at risk. This approach would provide the regulators with time to deal with one declining institution, but the results of the stress tests of 10 or 20 percent asset losses in the current study suggest that temporary forbearance is not much of a solution to protect several large institutions during a significant financial crisis.

Conclusion

TARP provided temporary support for the U.S. and global financial systems while restoring some confidence that markets would return toward normalcy. Aggregate TARP losses, estimated to be $117 billion on the investment of $581 billion, compared to the potential cost of a single failure of a very large bank, are not excessive. Long term solutions are being debated as part of the pending U.S. financial legislation and public policy changes.

END NOTES

[1] Paul Volker has claimed that the Obama regulatory reform proposals will maintain a policy of "Too Big To Fail" and could lead to future bailouts (see Wagner (2009, November 4). Volker recommends that reform proposals should exclude nonbank financial firms from the policy of "Too Big To Fail." He would also separate the most risky activities that *are not* services on behalf of consumers from the activities for which the public sector would provide support.

[2] U.S. regulators of insured depository institutions had already implemented a similar provision for large banks as part of their CAMELS analysis, which included capital adequacy (C), asset quality (A), capability of management (M), liquidity (L) , and sensitivity to market risk (S). (see Federal Reserve Bank of Chicago, 1997).

[3] Many of these loans were 2/28 and 3/27 subprime loans for which the initial low interest rate would rise dramatically at the end of 2 or 3 years, respectively, unless they could be refinanced. As property values declined, lenders refused refinancing, borrowers could not afford the higher rates (often more than twice the original rate), and foreclosures began.

[4] Today's VISA credit card began in 1958 as BankAmericard, a subsidiary of Bank of America.

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TABLE 1A. TARP Bank Data (March 31, 2009 $ in 000,000's)

Institution	TARP Injection	Total Assets	Total Capital	Tier 1 Capital	Net Loans	Real Estate Loans	Credit Card Loans	Other Loans	Risk Adjusted Assets	Securitized Assets
JPMorgan Chase & Co.	*$25,000	$1,688,164	$130,548	$100,437	$609,261	$352,472	$19,704	$237,085	$1,129,775	$190,459
Bank of America Corporation	$45,000	$1,434,037	$135,296	$89,936	$763,828	$381,988	$67,960	$313,881	$1,031,380	$59,170
Citigroup Inc	$45,000	$1,143,561	$109,321	$98,657	$518,701	$240,254	$34,242	$244,205	$673,427	$525,722
Wells Fargo & Company	$25,000	$552,170	$45,096	$34,837	$350,619	$203,699	$15,684	$131,236	$452,429	$265,375
The Goldman Sachs Group	*$10,000	$161,455	$14,838	$14,699	$4,724	$567	$0	$4,157	$135,475	$13,569
Morgan Stanley	*$10,000	$66,742	$5,993	$5,998	$13,279	$550	$0	$12,729	$45,166	$0
PNC Financial Services	$7,579	$140,011	$11,300	$9,353	$72,940	$38,208	$1	$34,730	$115,897	$598
U.S. Bancorp	*$6,599	$258,527	$21,764	$14,969	$180,411	$86,070	$13,066	$81,274	$221,434	$0
SunTrust Banks, Inc	$4,850	$174,237	$18,779	$12,444	$128,292	$78,862	$483	$48,947	$154,013	$127,393
Capital One	*$3,555	$118,175	$20,995	$8,558	$65,873	$30,530	$0	$35,343	$78,511	$0
Regions Financial Corp	$3,500	$137,000	$14,322	$9,707	$95,795	$70,647	$0	$25,147	$111,569	$171
Fifth Third Bancorp	$3,408	$68,458	$5,589	$4,973	$42,235	$19,683	$840	$21,711	$56,965	$18
BB&T Corp	*$3,134	$139,275	$13,622	$11,540	$96,238	$69,533	$101	$26,603	$108,560	$0
Bank of New York Mellon	*$3,000	$163,006	$11,980	$12,210	$30,893	$5,228	$0	$25,665	$100,164	$0
KeyCorp	$2,500	$95,515	$8,316	$7,814	$72,494	$31,946	$5	$40,543	$97,311	$0
CIT Group, Inc	$2,330	$3,882	$544	$543	$1,976	$1	$0	$1,975	$2,350	$0
Comerica Inc	$2,250	$67,462	$5,672	$5,671	$47,844	$20,806	$6	$27,032	$69,749	$0
State Street Corporation	*$2,000	$142,458	$14,168	$13,631	$7,660	$677	$0	$6,983	$74,205	$0
Marshall & Iisley Corporation	$1,715	$54,994	$4,532	$4,014	$43,240	$29,456	$0	$13,784	$49,991	$13
Northern Trust Corporation	*$1,576	$65,796	$4,466	$4,547	$18,334	$5,248	$0	$13,086	$41,297	$0
Zions BanCorporation	$1,400	$21,163	$1,243	$1,439	$14,308	$10,786	$94	$3,428	$18,612	$0
Huntington BancShares	$1,398	$451	$61	$62	$210	$208	$0	$2	$177	$0
Discover Financial Services	$1,224	$37,527	$4,999	$5,028	$26,068	$72	$25,596	$400	$33,056	$0
Average	$9,218	$292,786	$26,237	$20,481	$139,357	$72,934	$7,730	$58,693	$208,761	$51,412
Standard Deviation	$13,068	$468,132	$40,500	$30,904	$212,205	$111,955	$16,346	$87,714	$314,188	$124,718

* Institutions that repaid their TARP funds in June 2009

TABLE 1B. TARP Bank Ratios March 31, 2009

Institution	Total Capital: Total Assets	Tier 1 Capital: Risk-Adjusted Assets	Total Risk-Based Capital: Risk-Adjusted Assets	Net Loans: Total Assets	Real Estate: Net Loans	Credit Card: Net Loans	Other Loans: Net Loans	Securitized Assets: Total Assets
JPMorgan Chase & Co.	7.73%	8.89%	12.66%	36.09%	57.85%	3.23%	38.91%	11.28%
Bank of America Corporation	9.43%	8.72%	12.19%	53.26%	57.38%	8.90%	41.09%	4.13%
Citigroup Inc	9.56%	14.65%	18.19%	45.36%	46.32%	6.60%	47.08%	45.97%
Wells Fargo & Company	8.17%	7.70%	11.87%	63.50%	58.10%	4.47%	37.43%	48.06%
The Goldman Sachs Group, Inc	9.19%	10.85%	14.54%	2.93%	12.00%	0.00%	88.00%	8.40%
Morgan Stanley	8.98%	13.28%	16.74%	19.90%	4.14%	0.00%	95.86%	0.00%
The PNC Financial Services Group	8.07%	8.07%	11.13%	52.10%	52.38%	0.00%	47.61%	0.43%
U.S. Bancorp	8.42%	6.76%	10.80%	69.78%	47.71%	7.24%	45.05%	0.00%
SunTrust Banks, Inc	10.78%	8.08%	11.04%	73.63%	61.47%	0.38%	38.15%	73.11%
Capital One Financial Corporation	17.77%	10.90%	12.22%	55.74%	46.35%	0.00%	53.65%	0.00%
Regions Financial Corp	10.45%	8.70%	11.88%	69.92%	73.75%	0.00%	26.25%	0.12%
Fifth Third Bancorp	8.16%	8.73%	11.46%	61.69%	46.60%	1.99%	51.41%	0.03%
BB&T Corp	9.78%	10.63%	13.29%	69.10%	72.25%	0.11%	27.64%	0.00%
Bank of New York Mellon Corp	7.35%	12.19%	15.67%	18.95%	16.92%	0.00%	83.08%	0.00%
KeyCorp	8.71%	8.03%	12.09%	75.90%	44.07%	0.01%	55.93%	0.00%
CIT Group, Inc	14.00%	23.12%	24.38%	50.89%	0.03%	0.01%	99.96%	0.00%
Comerica Inc	8.41%	8.13%	11.95%	70.92%	43.49%	0.01%	56.50%	0.00%
State Street Corporation	9.95%	18.37%	19.87%	5.38%	8.84%	0.00%	91.16%	0.00%
Marshall & Iisley Corporation	8.24%	8.03%	11.94%	78.63%	68.12%	0.00%	31.88%	0.02%
Northern Trust Corporation	6.79%	11.01%	14.00%	27.86%	28.63%	0.00%	71.37%	0.00%
Zions BanCorporation	5.88%	7.73%	10.08%	67.61%	75.38%	0.66%	23.96%	0.00%
Huntington BancShares	13.57%	34.95%	35.43%	46.56%	99.11%	0.00%	0.89%	0.00%
Discover Financial Services	13.32%	15.21%	16.64%	69.47%	0.28%	98.19%	1.54%	0.00%
Average	9.68%	11.86%	14.79%	51.53%	44.40%	5.73%	50.19%	7.66%
Standard Deviation	2.70%	6.39%	5.65%	22.80%	26.90%	20.33%	27.59%	19.53%

Table 2A. Citigroup (March 31, 2009 $ in 000,000,000s)

	Assets		Total Asset & Tier 1 Capital Loss	Tier 1 Capital: Risk Adjusted Assets	Total Capital: Total Assets
				Before Loss = 14.64%	Before Loss = 9.56%
	Before Loss	After Loss		After Loss	After Loss
10% Real Estate Loan Loss	$240.20	$216.18	$24.02	11.08%	7.46%
20% Real Estate Loan Loss	$240.20	$192.16	$48.04	7.51%	5.36%
10% Credit Card Loan Loss	$34.20	$30.78	$3.42	14.13%	9.26%
20% Credit Card Loan Loss	$34.20	$27.36	$6.84	13.63%	8.96%
10% Other Loans Loss	$244.20	$219.78	$24.42	11.02%	7.42%
20% Other Loans Loss	$244.20	$195.36	$48.84	7.39%	5.29%
10% Securitized Asset Loss	$525.70	$473.13	$52.57	6.84%	4.96%
20% Securitized Asset Loss	$525.70	$420.56	$105.14	-0.97%	0.36%

Table 2B. Bank of America (March 31, 2009 $ in 000,000,000s)

	Assets		Total Asset & Tier 1 Capital Loss	Tier 1 Capital: Risk Adjusted Assets	Total Capital: Total Assets
				Before Loss = 8.72%	Before Loss = 9.44%
	Before Loss	After Loss		After Loss	After Loss
10% Real Estate Loan Loss	$382.00	$343.80	$38.20	5.01%	6.77%
20% Real Estate Loan Loss	$382.00	$305.60	$76.40	1.31%	4.11%
10% Credit Card Loan Loss	$68.00	$61.20	$6.80	8.06%	8.96%
20% Credit Card Loan Loss	$68.00	$54.40	$13.60	7.40%	8.49%
10% Other Loans Loss	$313.90	$282.51	$31.39	5.67%	7.25%
20% Other Loans Loss	$313.90	$251.12	$62.78	2.63%	5.06%
10% Securitized Asset Loss	$59.20	$53.28	$5.92	8.14%	9.02%
20% Securitized Asset Loss	$59.20	$47.36	$11.84	7.57%	8.61%

Table 2C. JP Morgan Chase (March 31, 2009 $ in 000,000,000s)

	Assets		Total Asset & Tier 1 Capital Loss	Tier 1 Capital: Risk Adjusted Assets	Total Capital: Total Assets
				Before Loss = 8.89%	Before Loss = 7.73%
	Before Loss	After Loss		After Loss	After Loss
10% Real Estate Loan Loss	$352.50	$317.25	$35.25	5.77%	5.64%
20% Real Estate Loan Loss	$352.50	$282.00	$70.50	2.65%	3.55%
10% Credit Card Loan Loss	$19.70	$17.73	$1.97	8.71%	7.61%
20% Credit Card Loan Loss	$19.70	$15.76	$3.94	8.54%	7.50%
10% Other Loans Loss	$237.10	$213.39	$23.71	6.79%	6.33%
20% Other Loans Loss	$237.10	$189.68	$47.42	4.69%	4.92%
10% Securitized Asset Loss	$190.50	$171.45	$19.05	7.20%	6.60%
20% Securitized Asset Loss	$190.50	$152.40	$38.10	5.51%	5.47%

Table 2D. Wells Fargo (March 31, 2009 $ in 000,000,000s)

	Assets		Total Asset & Tier 1 Capital Loss	Tier 1 Capital: Risk Adjusted Assets	Total Capital: Total Assets
				Before Loss = 7.69%	Before Loss = 8.17%
	Before Loss	After Loss		After Loss	After Loss
10% Real Estate Loan Loss	$203.70	$183.33	$20.37	3.19%	4.48%
20% Real Estate Loan Loss	$203.70	$162.96	$40.74	-1.31%	0.79%
10% Credit Card Loan Loss	$15.70	$14.13	$1.57	7.35%	7.88%
20% Credit Card Loan Loss	$15.70	$12.56	$3.14	7.00%	7.60%
10% Other Loans Loss	$121.20	$109.08	$12.12	5.01%	5.97%
20% Other Loans Loss	$121.20	$96.96	$24.24	2.33%	3.78%
10% Securitized Asset Loss	$265.40	$238.86	$26.54	1.83%	3.36%
20% Securitized Asset Loss	$265.40	$212.32	$53.08	-4.04%	-1.45%

Table 3. Bank 1 and Bank 2 Capital Losses*

Real Estate Loans	Bank 1			Bank 2		
	Huntington BancShares			Zions BanCorporation		
Real Estate Loans:Net Loans	99.11%			75.38%		
Real Estate Loan Loss Effects	Before Loss	10% Loss	20% Loss	Before Loss	10% Loss	20% Loss
Tier 1 Capital:Risk-Adjusted Assets	34.95%	23.28%	11.53%	7.74%	1.94%	-3.86%
Total Capital:Total Assets	13.57%	8.91%	4.30%	5.83%	0.78%	-4.32%

Credit Card Loans	Bank 1			Bank 2		
	Discover Financial Services			U.S. Bancorp		
Credit Card Loans:Net Loans	98.19%			7.24%		
Credit Card Loan Loss Effects	Before Loss	10% Loss	20% Loss	Before Loss	10% Loss	20% Loss
Tier 1 Capital:Risk-Adjusted Assets	15.21%	7.47%	-0.28%	6.76%	6.17%	5.58%
Total Capital:Total Assets	13.32%	6.50%	-0.32%	8.42%	7.91%	7.41%

Other Loans	Bank 1			Bank 2		
	CIT Group			State Street Corporation		
Other Loans:Net Loans	99.96%			95.86%		
Other Loans Loss Effects	Before Loss	10% Loss	20% Loss	Before Loss	10% Loss	20% Loss
Tier 1 Capital:Risk-Adjusted Assets	23.12%	14.70%	6.30%	18.37%	17.43%	16.49%
Total Capital:Total Assets	14.00%	5.09%	-10.18%	9.95%	9.46%	8.97%

Securitized Assets	Bank 1			Bank 2		
	PNC Bank			Sun Trust Bank		
Securitized Assets:Total Assets	0.43%			73.11%		
Securitized Assets Loss Effects	Before Loss	10% Loss	20% Loss	Before Loss	10% Loss	20% Loss
Tier 1 Capital:Risk-Adjusted Assets	8.07%	8.02%	7.97%	8.08%	-0.20%	-8.49%
Total Capital:Total Assets	8.07%	8.03%	7.99%	10.78%	3.45%	-3.87%

*Banks 1 and 2 are the two banks with the highest percent of their net loans in a particular asset category

Table 4. Aggregate Losses* (March 31, 2009 $ in 000,000,000s)

BANK	Total Assets	Total Capital	Asset & Capital Losses	Tier 1 Capital: Risk Adjusted Assets	Total Capital: Total Assets
				AFTER 20% Loss	
JP Morgan Chase	$1,688.20	$130.50	$117.92	-1.55%	0.75%
Bank of America	$1,434.00	$135.30	$139.18	-4.78%	-0.27%
Citigroup	$1,143.60	$109.30	$96.88	0.27%	1.09%
Wells Fargo	$552.20	$45.10	$66.98	-7.11%	-3.96%

*20% aggregate loss for the sum of real estate and other loans

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May 6, 2010

America's Addiction to Debt

By: Hon. David M. Walker, President and CEO of the Peter G. Peterson Foundation
and Former Comptroller General of the United States (1998-2008)

Chairman Moore, Ranking Member Biggert and members of the sub-committee, thank you for the opportunity to testify today. My testimony is based on my many years of experience in the public, private and not-for profit sectors, including serving as the current President and CEO of the Peter G. Peterson Foundation, and as a former Comptroller General of the United States and head of the GAO from 1998-2008.

It is very important to state at the outset of this hearing that not all debt and leverage is bad. For example, individuals may take on debt to purchase a home, to finance their education or their children's education, or to make other investments designed to improve their future or their family's future. Businesses may take on debt in order to start operations, expand their businesses, conduct research or otherwise improve their future prospects. Country's may take on debt to make investments in areas like basic research, education innovation and critical infrastructure that can help to grow the economy, improve its competitive posture and enhance future prospects. Individuals, businesses and countries may also take on debt temporarily in order to deal with economic downturns and unexpected emergencies, including wars in the case of sovereign nations. However, individuals, businesses and countries must not become accustomed to taking on debt in order to finance their ongoing operating costs and current wants and at the expense of future needs.

Now let me turn to the U.S. Government, which is what I was asked to focus my testimony on today. It is clear that the United States is a great nation, possibly the greatest in the history of all mankind. At the same time, our country is resting on our past success and our current sole "Superpower" status while, at the same time, ignoring a range of leading indicators that clearly demonstrate that we are on an imprudent and unsustainable path in many respects. This includes such areas a public finance, savings rates, educational performance, health care costs and outcomes, and the state of our nation's critical infrastructure.

The truth is, our country's future standing and the standard of living for future generations of Americans is threatened by these and other key sustainability challenges. Given the subject of this hearing, I will focus my remarks today on America's structural deficits, growing debt burdens, increased reliance on foreign lenders and low savings rates. These are the issues that are most relevant to this series of sub-committee hearings.

During the first approximate 200 years of our republic's existence, the federal government did not experience significant and recurring deficits unless the country was at war, was experiencing a depression or recession, or faced some other major national emergency (See Exhibit I). However, within the past several decades, both America and too many Americans became addicted to spending, deficits and debt. This cultural challenge is real, and it has reached epidemic proportions in Washington, DC. As an example, total federal debt levels (in nominal terms) have more than doubled in less than 10 years (See Exhibit II), and they could double again within the next 10 years absent a dramatic course correction.

Today, the all too typical discussion in Washington is not whether we should seek to balance the budget and reduce our relative debt burdens, but what level of recurring deficits and debt burdens should be acceptable. Some argue that running deficits equal to the size of our nation's economic growth should be acceptable even when the country is at peace and does not face any major economic challenges or other current crises that might justify a temporary increase in federal spending. The problem with this deficit and debt philosophy is that when the economy is in recession, the country is at war, and/or a national crisis occurs or natural disaster strikes, deficits can soar to astronomical levels. For example, in fiscal 2009, the United States ran a $1.41 trillion federal deficit equal to about 9.9 percent of the nation's economy. Most of this deficit was inherited by President Obama and was due primarily to temporary reductions in revenues and increases in spending attributable to the recession, two undeclared and unfinanced wars, and the major housing/financial system crisis. While the deficit for fiscal 2010 is expected to decline somewhat, it is still expected to exceed $1.3 trillion.

Clearly trillion dollar plus deficits are a matter of growing public concern. It is, however, important to understand that our short-term deficits do not represent the real threat to our collective future. That real threat is represented by the large and growing structural deficits that we will face after the economy has recovered, after unemployment is lower, after the wars are over, and long after the recent crises have passed. These deficits and debt burdens are the ones that threaten our "Ship of State" at home and our standing around the world. They are driven largely by current entitlement programs, escalating health care costs, and a growing gap between projected federal spending levels and revenues. Absent dramatic and fundamental spending and tax reforms, our federal debt levels are expected to skyrocket in the future (See Exhibit III).

Our structural deficits represent a true national security challenge. After all, a nation's economy must be strong for it to be respected abroad and effective on the home front.

Federal spending levels have grown by almost 300 percent net of inflation over the past 40 years and the federal budget is now dominated by mandatory spending programs that grow on autopilot (See Exhibit IV). These mandatory spending programs serve to constrain our ability to invest and to help create a better future.

In addition to direct spending programs, the federal government foregoes about $1 trillion in revenues a year due to various tax deductions, exemptions, credits and other preferences. The top five tax preferences alone exceed total estimated federal spending on Medicare in this year (See Exhibit V). These and other tax preferences are also on auto-pilot and are not subject to periodic review and reauthorization.

Direct federal spending is expected to skyrocket based on existing federal programs and policies (See Exhibit VI). While reasonable people can and do differ on whether or not the recently enacted health care reform legislation will improve or worsen our federal deficit and debt outlook, it will clearly result in higher federal spending beyond the levels projected in Exhibit VI.

From a broader financial perspective, the federal government's total liabilities, commitments/contingencies and unfunded promises for Medicare and Social Security more than tripled between September 30, 2000 and September 30, 2009 (See Exhibit VII). Medicare alone was over $38 trillion in the hole as of September 30, 2009. This amount increases every year that we delay taking action to reduce health care costs and better target taxpayer subsidies under Medicare's voluntary Part B and Part D programs.

While many are rightfully concerned about the serious threat posed by rapidly increasing health care costs, they do not represent our fastest growing federal expense. Believe it or not, interest costs are expected to be the single largest line item in the federal budget within 10 years. In addition, with just a two percent (200 basis point) increase in projected interest costs, by 2040, the only thing the federal government could pay based on historical levels of revenue to GDP is interest on the mounting federal debt (See Exhibit VIII). And what do we get for that interest? Nothing!

Due to our low savings rate, and large spending appetite, America has become unduly reliant on foreign investors to finance our federal deficits and debt (See Exhibit IX). This is not in our nation's long-term economic, foreign policy, national security or domestic tranquility interests.

The history of the Suez Crisis in 1956 and the U.S. Government's more recent actions in connection with the guarantee of Fannie Mae and Freddie Mac debt in 2009 serve to demonstrate what can happen when you rely too much on foreign lenders. After all, you must pay attention to your bankers, especially if you want them to continue to lend you huge sums of money at low interest rates.

We must also recognize that current Treasury rates are low by historical standards (See Exhibit X) and foreign holdings of Treasury securities are largely in shorter maturities (See Exhibit XI). Therefore, a sudden increase in interest rates could have a dramatic and adverse affect on the federal budget, the cost of credit, and the overall economy.

As I have traveled the country and appeared in the media promoting the need for fiscal responsibility, many have asked me: Are we Greece? Their question is based on the current economic challenges facing that country which were driven in large part by dramatic increases in spending, escalating deficits and growing debt burdens. The answer that I typically give is that the U.S. is not in the same situation as Greece is today; however, we need to learn from the lessons of Greece and past history if we want to avoid a similar crisis of confidence in the future.

Most Americans would be surprised to know that the total U.S. public debt levels (i.e., federal, state and local) are already comparable to some of the financially troubled countries in Europe (See Exhibit XII). And these numbers do not include the trillions in debt owed to various federal "trust funds", like Social Security and Medicare. They also do not include the trillions in Fannie Mae and Freddie Mac debt that was recently guaranteed by the U.S. Government, and that some believe should be consolidated with the U.S. government's financial statements.

The truth is that the debt to GDP numbers that the federal government pushes to the public serve to understate our nation's true leverage. For example, current debt held by the public is about 58 percent of GDP and rising rapidly. However, by adding the debt owed to Social Security, Medicare and other trust funds, the debt/GDP ratio would already be about 89 percent of GDP and rising rapidly. Most economists believe that economic growth starts to suffer when federal debt rises to 90 percent of GDP and that federal debt to GDP in excess is 100 percent is a matter is real concern. We are rapidly approaching those levels and if you count the Fannie Mae and Freddie Mac debt we are already well past them.

While my testimony focuses on the federal government, other levels of government also face serious structural deficit challenges that must be addressed. For example, most states face large structural deficits due to Medicaid costs, unfunded retiree health plans, underfunded pension plans, deferred maintenance and other critical infrastructure needs, and public education requirements. Therefore, our national challenge is greater than our federal challenge. As a result, all levels of government will ultimately need to re-prioritize and re-engineer themselves to focus more on the future, true needs rather than unlimited wants, and generating real results.

What about savings rates? U.S. personal savings rates as a percentage of disposable income have declined dramatically from the very high World War II levels (See Exhibit XIII) and our average household savings rate is very low compared to other leading nations (See Exhibit XIV). Shockingly, due largely to huge federal deficits, the U.S. net national savings rate has plunged to the lowest level since the Great Depression (See Exhibit XV).

Why should we be concerned about this trend? Because savings represent the seed corn for a better future. With savings comes investment, new innovations, productivity improvements, capital enhancements and other things that help to promote economic growth, enhance our competitive posture and increase our standard of living.

At the same time that savings rates have plunged, household debt levels have risen dramatically (See Exhibit XVI) and the level of federal debt held by the public as a percentage of GDP has also risen dramatically in recent years (See Exhibit XVII). In fact, the total debt held by the public as a percentage of the economy is at the highest level since the record levels resulting from World War II. The combination of declining savings rates and increased debt burdens represent a clear threat to our country's future prospects.

As I previously mentioned, the most serious financial threat to our country's future is not today's deficits and debt levels. No, the real threat is represented by the escalating deficits (See Exhibit XVIII) and debt burdens we will face in the future based on our current fiscal path (See Exhibit III).

We must recognize the reality that the same four factors that contributed to the mortgage-related sub-prime crisis exist in connection with the federal government's own finances. Specifically, a disconnect between those who benefit from prevailing practices and those who will pay the price and bear the burden when the bubble bursts. Second, not enough transparency on the nature, extent and magnitude of the real risks. Third, too much debt, not enough focus on cash flow, and over reliance on credit ratings. Finally, a failure of existing governance, risk management, oversight and regulatory functions to act until a crisis is at the doorstep.

There are, however, two big differences between the mortgage-related sub-prime challenge and the U.S. Government's own deteriorating financial condition. First, the size, scope and potential adverse consequences associated with a loss of confidence in the federal government being able to put its financial house in order are much greater. Second, no one is going to "bailout" America. We need to face the facts and start making tough choices before we reach a "tipping point" and risk losing the confidence of our foreign lenders. In my view, the real risk related question in this regard is not whether the U.S. will default, but rather what will the value of the dollar be in the future. It's not clear whether and to what extent credit ratings agencies consider this factor in their ratings decisions.

Many are asking, why have the markets not already reacted to these disturbing trends? First, markets tend to be myopic. Second, there isn't enough information widely available, well understood and effectively communicated in connection with our federal finances. Finally, many people acknowledge that we while face serious fiscal challenges, they assert that some other nation's face greater fiscal challenges. This can lead to a temporary flight to relative quality until people wake-up and when they do, things can change very quickly. Why would we want to take the related risk when the numbers are so clear and compelling?

Clearly the U.S. benefits from being the largest economy in the world and the world's leading reserve currency. This gives us more time and rope to play with but neither are unlimited. In my view, the U.S. also benefits from some "home team bias" since the most of the major credit ratings agencies are based in the U.S. These agencies are not infallible, as was evident in connection with their flawed ratings of a range of mortgage-backed securities in the recent housing and financial crisis.

In closing, America is a great nation, but we are at a critical crossroads. The fiscal decisions that elected officials make or fail to make within the next 3-5 years will largely determine whether our collective future will be better than out past. We must wake-up, recognize reality, and make tough choices in order to help ensure that America stays strong, the American dream stays alive and our future is better than our past. However, to do so we need to employ special processes since the regular legislative order is broken. We should also act sooner rather than later and before we face an immediate crisis where things could spin out of control.

Ultimately we will need to take a range of steps that will help us recapture fiscal flexibility and stabilize our debt/GDP at a reasonable and sustainable level (e.g., 60 percent of GDP). This includes re-imposing tough but realistic statutory budget controls, achieving comprehensive Social Security reform, increasing overall savings rates, enacting health care reform that reduces health care costs and stabilizes total health care costs as a percentage of the budget and the economy, implementing defense and other spending reprioritization and constraint, and engaging in comprehensive tax reform that will raise more revenues as a percentage of the economy. A number of such illustrative reform proposals are outlined on our foundation's web site at www.pgpf.org, and additional reform options are included in my book entitled Comeback America: Turning the Country Around and Restoring Fiscal Responsibility. More information on this book can be found at www.comebackamericathebook.com.

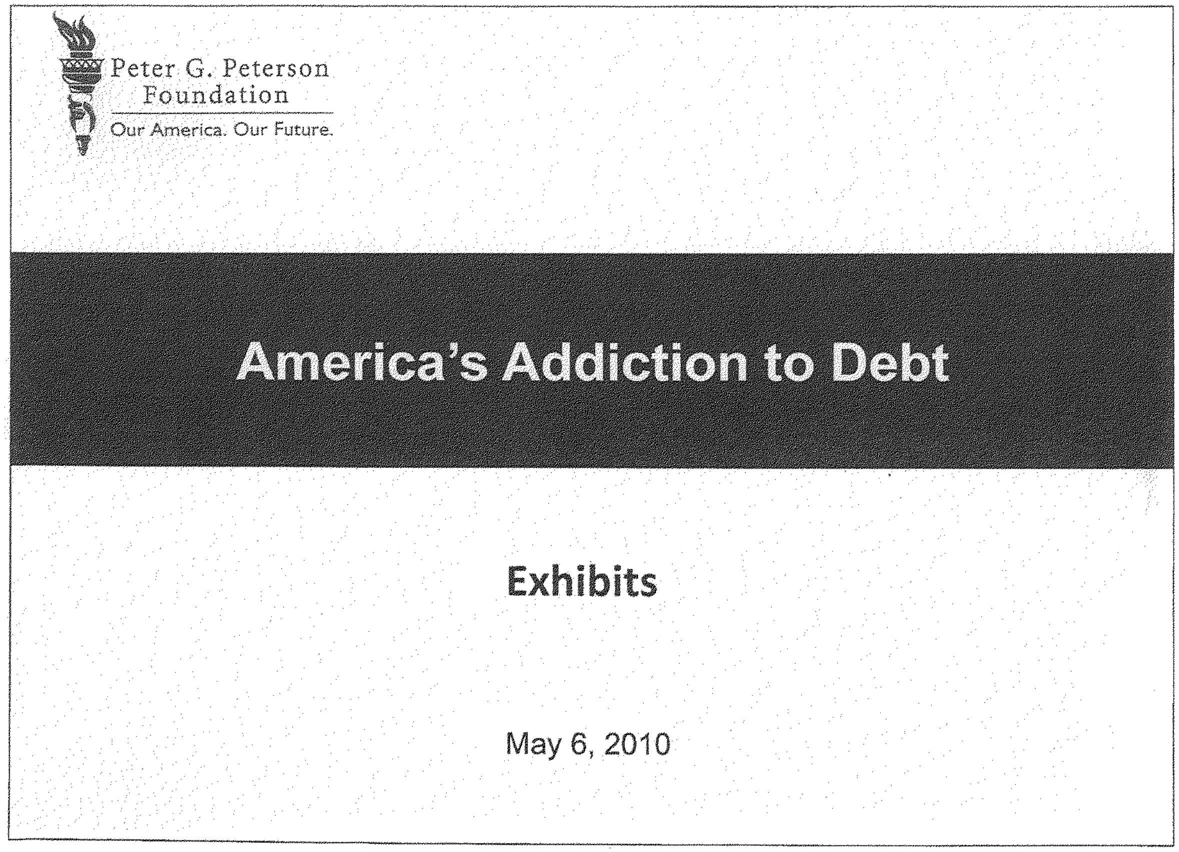
What does the public think about this issue? In a November 2009 survey sponsored by the Peterson Foundation, 80 percent of the American people responded that they are concerned about our nation's finances and feel that action is needed to put them in order. In addition, an April 2010 Global Strategy Group survey that polled former top federal government economic and budget officials showed 100 percent agreement that the federal government is currently on an unsustainable longer term fiscal path.

A super majority of these officials also agreed that action should be taken within the next one to two years to begin to address it.

We are encouraged by the President's creation of a Fiscal Responsibility and Reform Commission to help address this important issue. However, in the final analysis, concrete action by responsible elected officials is required if we want our republic to stand the test of time and ensure that our future will be better than our past. It is also important that we act sooner rather than later because the changes that will be necessary will only grow larger with the passage of time (See Exhibit XIX).

We at the Peterson Foundation will continue to do our part to help promote more federal fiscal responsibility and accountability today in order to create more opportunity tomorrow. This includes, but is not limited to, educating and activating the American people about our challenge and a range of sensible solutions in order to accelerate action in Washington. Yes, we at the Peterson Foundation will do our part; all that I ask is that you do yours. Our nation's founders and our families deserve no less.

Thank you again for the opportunity to testify. I would be happy to answer any questions you may have.



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America's Addiction to Debt

Exhibits

May 6, 2010

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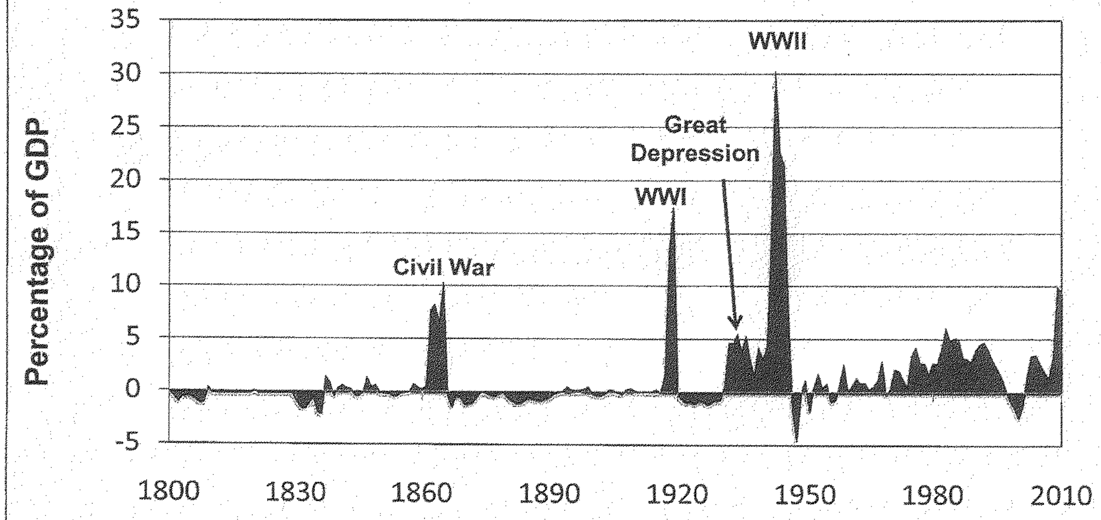
Up until the Great Depression the U.S. experienced more budget surpluses (-) than deficits (+)



SOURCES: Data the Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget, Historical Tables*, February 2010, the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook*: January 2010 Update, alternative simulation using Congressional Budget Office assumptions and other government sources. Compiled by PGPF.

Exhibit I

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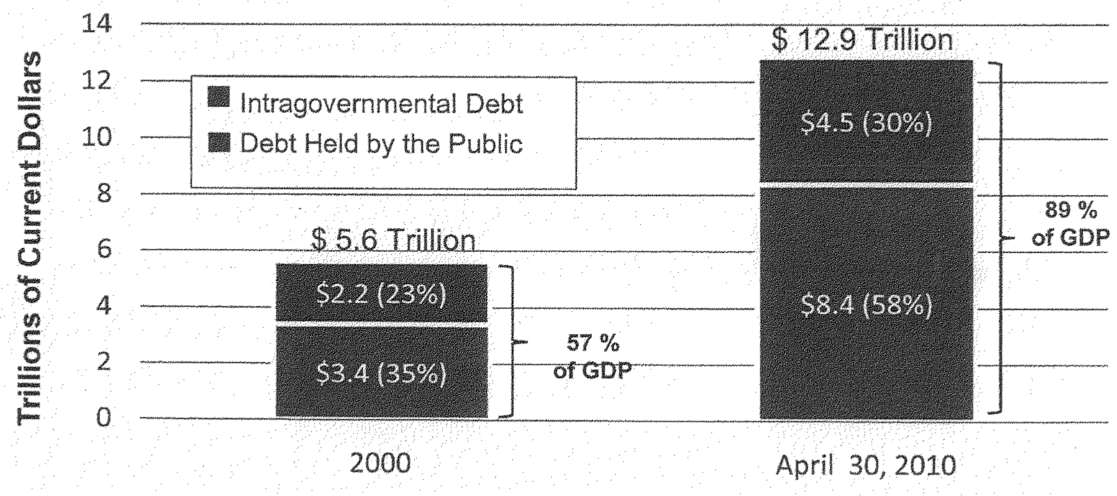
The total debt includes debt held by the public (domestic and foreign investors) and debt the government owes to various government programs*



*Intragovernmental debt includes Treasury securities held by federal trust funds (e.g., Social Security and Medicare) and other government accounts. Debt held by the public includes both domestic and foreign holders of Treasury Securities.

NOTE: Totals may not add due to rounding.

SOURCES: Data from the Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget (February 1, 2010)*, Historical Tables, Department of Treasury, *Daily Treasury Statement* (April 15, 2010) and Congressional Budget Office, *Preliminary Analysis of the President's Budget*: March 2010. Compiled by PGPF.

Exhibit II

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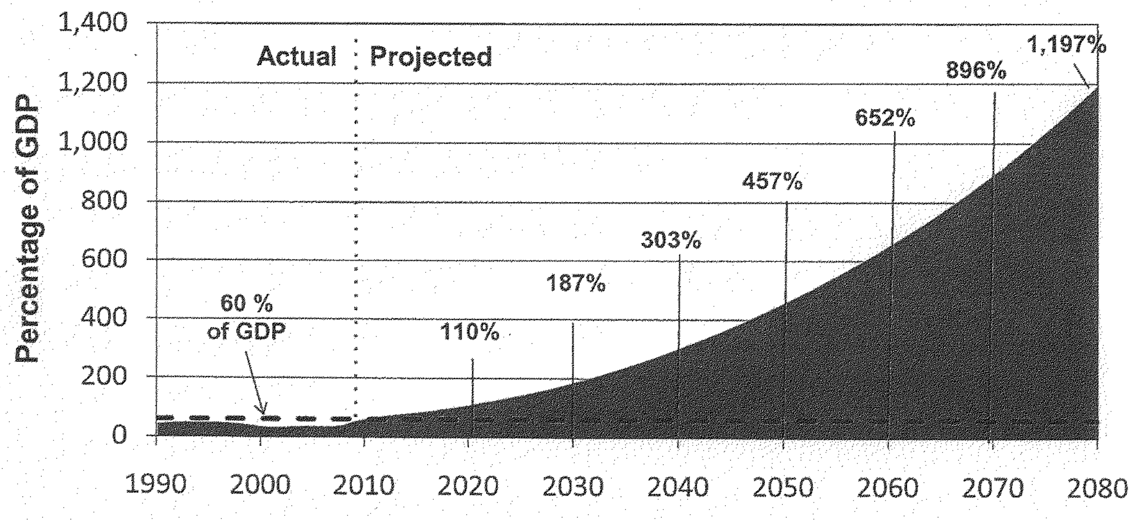
Future U.S. debt held by the public is projected to soar if current policies remain unchanged



NOTE: Debt held by the public refers to all federal debt held by individuals, corporations, state or local governments, and foreign entities.
SOURCES: Data from the Congressional Budget Office, *Long-Term Budget Outlook: June 2009*, the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook, January 2010 Update*, alternative simulation using Congressional Budget Office assumptions. Compiled by PGPF.

Exhibit III

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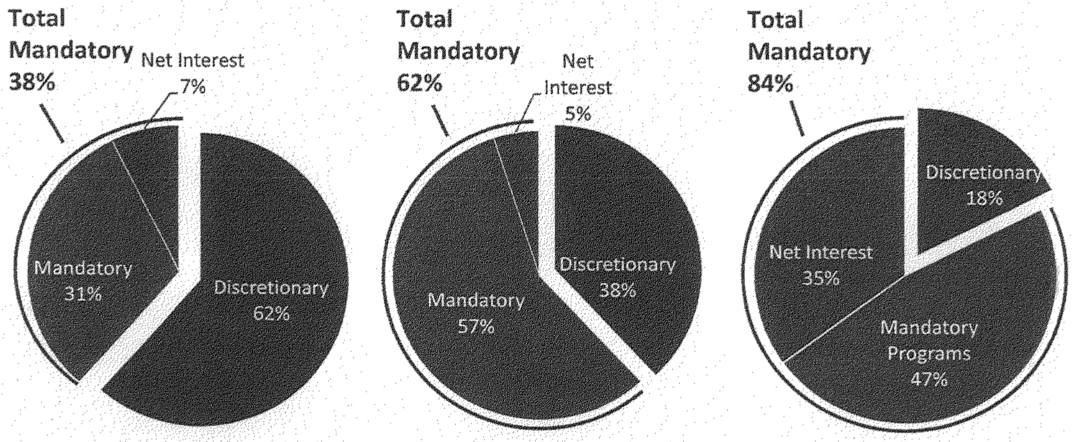
Mandatory programs – including Social Security, Medicare, Medicaid and other entitlement programs – and interest costs are taking over more and more of the federal budget



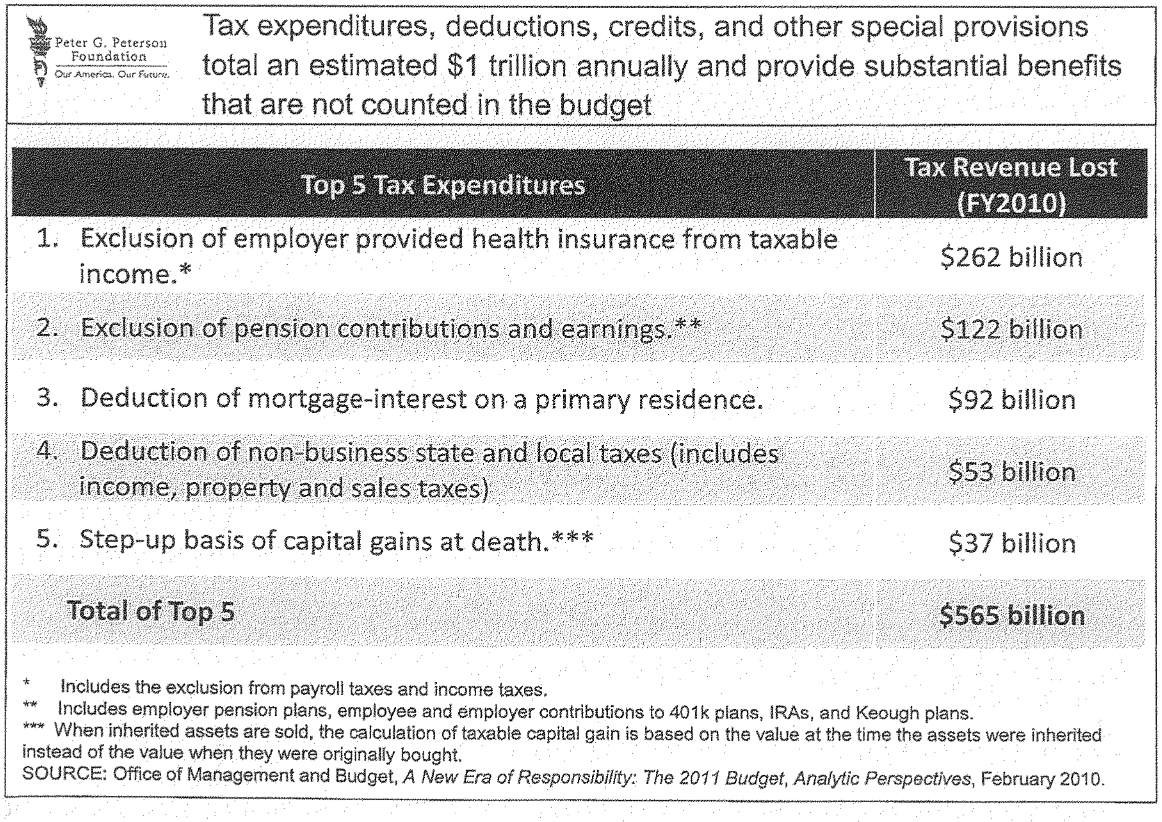
Total Spending 1970:
$900 Billion
(Constant 2009 Dollars)

Total Spending 2010:
$3.5 Trillion (est.)
(Constant 2009 Dollars)

Total Spending 2040:
$11.8 Trillion (est.)
(Constant 2009 Dollars)

SOURCES: Data derived from the Office of Management and Budget, *FY 2011 Budget, Historical Tables*, February 2010; and the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook*, January 2010 Update, alternative simulation using Congressional Budget Office assumptions. Calculated by PGPF.

Exhibit IV



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Tax expenditures, deductions, credits, and other special provisions total an estimated $1 trillion annually and provide substantial benefits that are not counted in the budget

Top 5 Tax Expenditures	Tax Revenue Lost (FY2010)
1. Exclusion of employer provided health insurance from taxable income.*	$262 billion
2. Exclusion of pension contributions and earnings.**	$122 billion
3. Deduction of mortgage-interest on a primary residence.	$92 billion
4. Deduction of non-business state and local taxes (includes income, property and sales taxes)	$53 billion
5. Step-up basis of capital gains at death.***	$37 billion
Total of Top 5	**$565 billion**

* Includes the exclusion from payroll taxes and income taxes.

** Includes employer pension plans, employee and employer contributions to 401k plans, IRAs, and Keough plans.

*** When inherited assets are sold, the calculation of taxable capital gain is based on the value at the time the assets were inherited instead of the value when they were originally bought.

SOURCE: Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget, Analytic Perspectives*, February 2010.

Exhibit V

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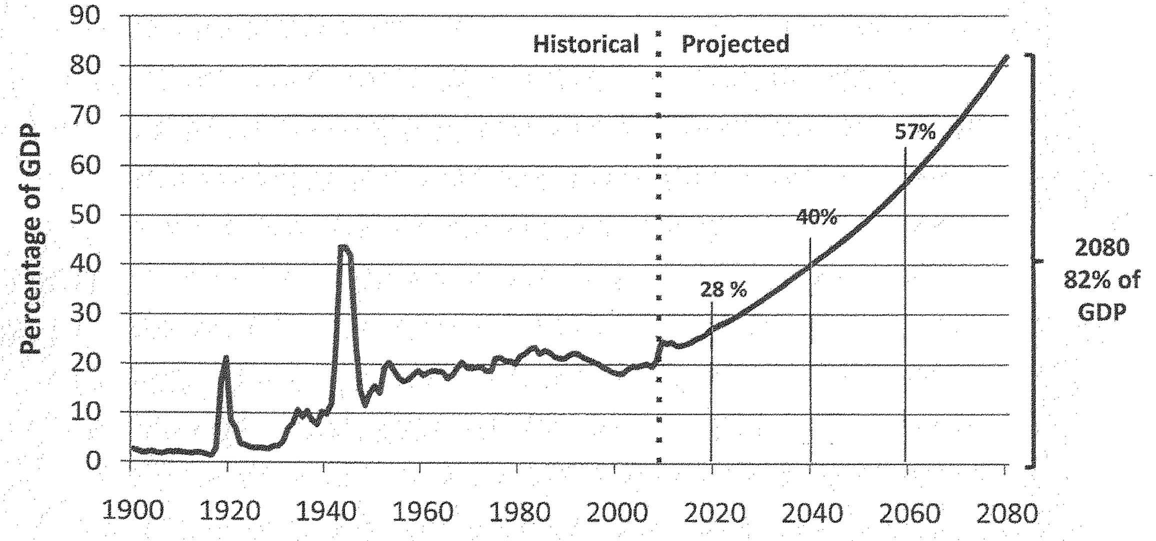
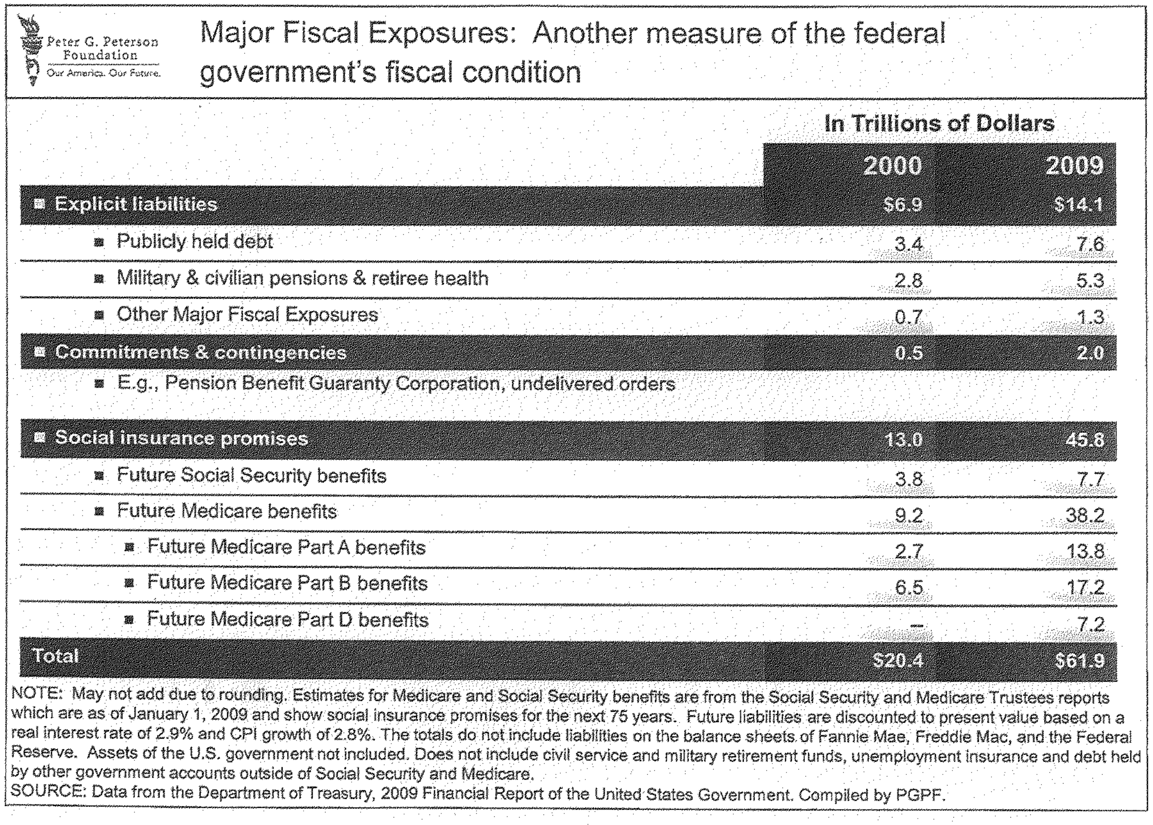
Our America. Our Future.

Federal spending is projected to soar far above its 50-year average of 20.5 percent of GDP if current policies remain unchanged



SOURCES: Data from the *Historical Statistics of the United States*, Millennial Edition Online, Cambridge 2006, the Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget, Historical Tables*, February 2010, and the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook,* January 2010 Update, alternative simulation using Congressional Budget Office assumptions. Compiled by PGPF.

Exhibit VI



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Major Fiscal Exposures: Another measure of the federal government's fiscal condition

In Trillions of Dollars

	2000	2009
■ **Explicit liabilities**	$6.9	$14.1
■ Publicly held debt	3.4	7.6
■ Military & civilian pensions & retiree health	2.8	5.3
■ Other Major Fiscal Exposures	0.7	1.3
■ **Commitments & contingencies**	0.5	2.0
■ E.g., Pension Benefit Guaranty Corporation, undelivered orders		
■ **Social insurance promises**	13.0	45.8
■ Future Social Security benefits	3.8	7.7
■ Future Medicare benefits	9.2	38.2
■ Future Medicare Part A benefits	2.7	13.8
■ Future Medicare Part B benefits	6.5	17.2
■ Future Medicare Part D benefits	—	7.2
Total	$20.4	$61.9

NOTE: May not add due to rounding. Estimates for Medicare and Social Security benefits are from the Social Security and Medicare Trustees reports which are as of January 1, 2009 and show social insurance promises for the next 75 years. Future liabilities are discounted to present value based on a real interest rate of 2.9% and CPI growth of 2.8%. The totals do not include liabilities on the balance sheets of Fannie Mae, Freddie Mac, and the Federal Reserve. Assets of the U.S. government not included. Does not include civil service and military retirement funds, unemployment insurance and debt held by other government accounts outside of Social Security and Medicare.
SOURCE: Data from the Department of Treasury, 2009 Financial Report of the United States Government. Compiled by PGPF.

Exhibit VII

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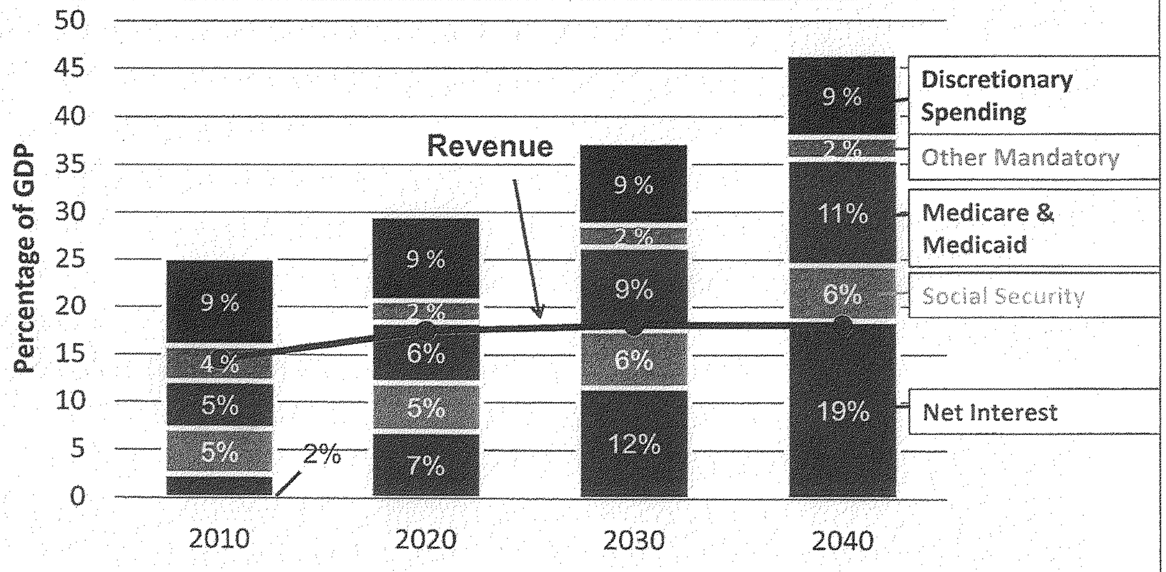
Without fiscal reforms, federal interest costs alone would consume all projected revenues by 2040 if baseline interest rates rise 2 percent to 7.4%. (The historical interest rate since 1980 is 6.4%.)



NOTE: Implied average interest rate in baseline is 4.8 percent in 2019 and thereafter. A 2 percent rate increase would be within historic range for Treasury interest rates.
SOURCE: Data from the Government Accountability Office *The Federal Government's Long-Term Fiscal Outlook:* January 2010, alternative simulation using Congressional Budget Office assumptions. Compiled by PGPF.

Exhibit VIII

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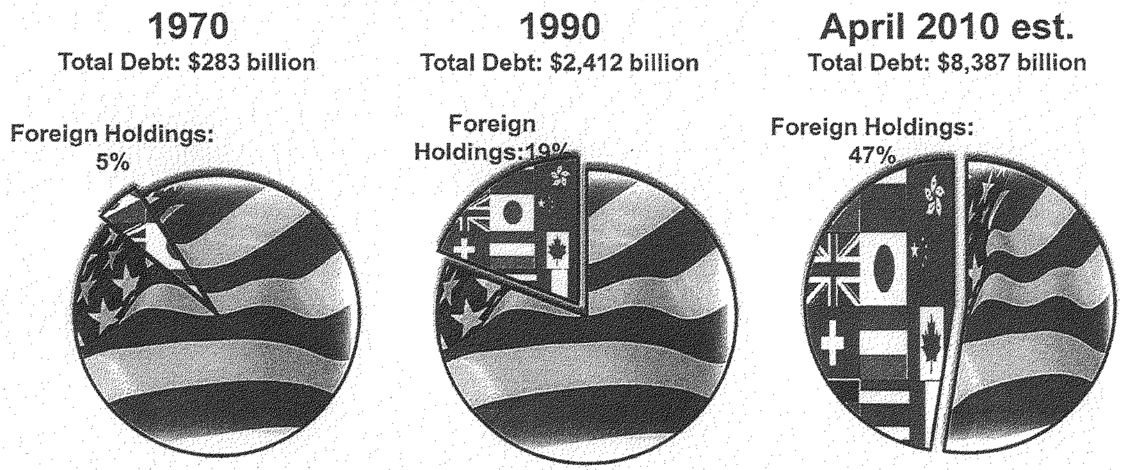
U.S. dependency on foreign lenders to finance the public debt has risen sharply



SOURCE: Data for 1970 and 1990 from the Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget, Analytical Perspectives*, February 2010. Data for 2010 from Department of Treasury, *Daily Treasury Statement (April 15, 2010)* and Treasury International Capital Reporting System, April 15, 2010 release. Compiled by PGPF.

Exhibit IX

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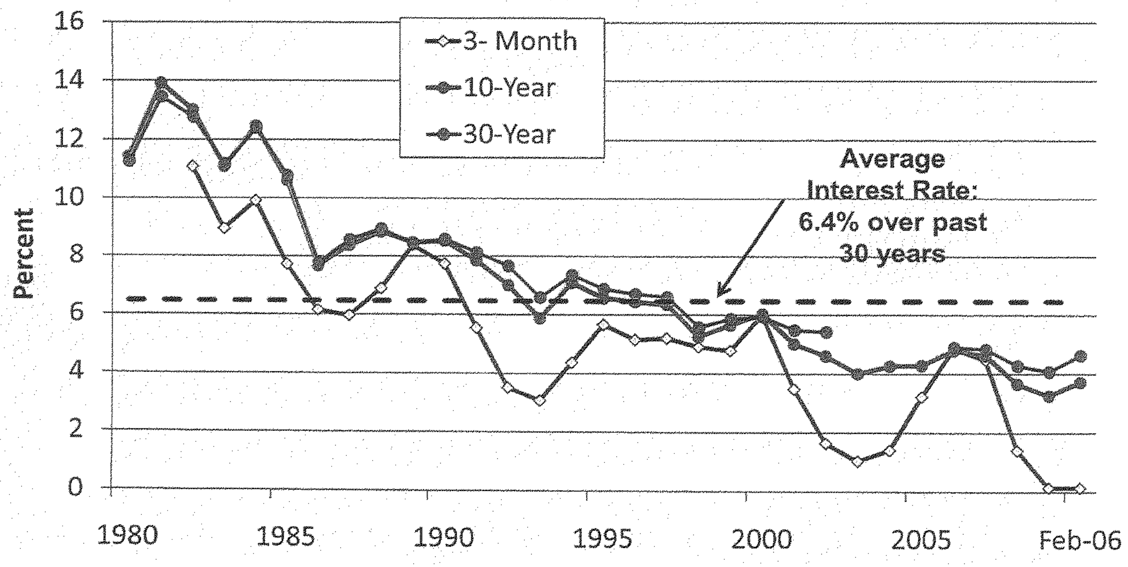
Current Treasury interest rates are low by historical standards



NOTE: The U.S. Treasury Department did not offer 30-year bonds between 2003 and 2006.
SOURCE: Data from the Federal Reserve *Statistical Release*, Table H.15, Selected Interest Rates, Historical Data, accessed April 14, 2010.
Complied by PGPF.

Exhibit X

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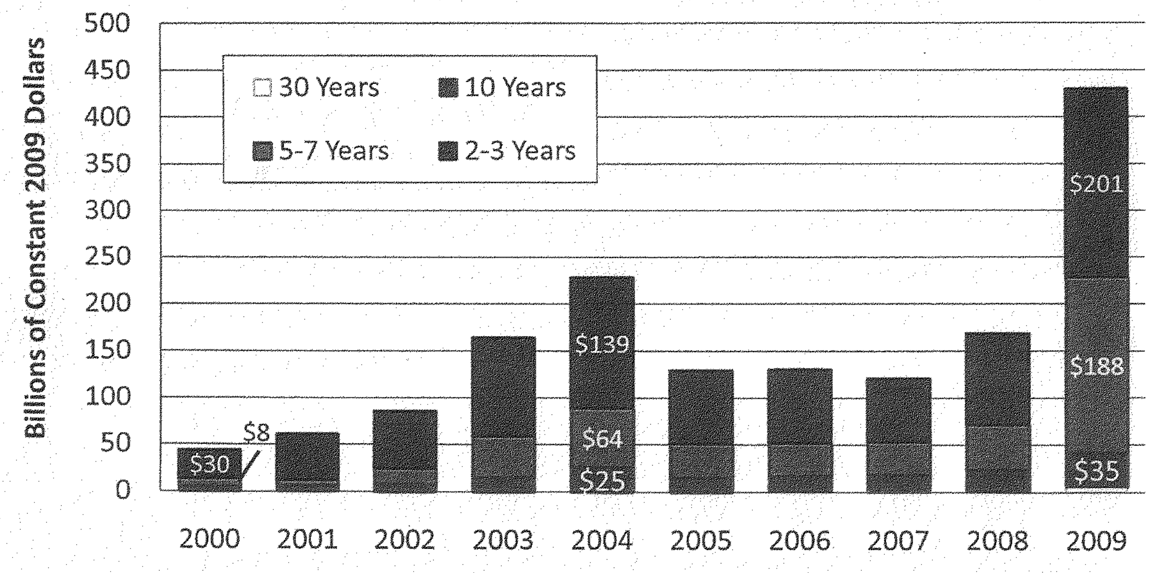
Foreign purchases of Treasury securities are largely in shorter maturities, indicating sizeable interest-rate risk upon rollover



NOTE: Purchases only reflect gross foreign purchases, and they exclude gross sales of Treasury Inflation Protected Securities (TIPS) by foreign investors.
SOURCE: Data from the U.S. Treasury, Office of Debt Management, Investor Class Auction Allotments. Compiled by PGPF.

Exhibit XI

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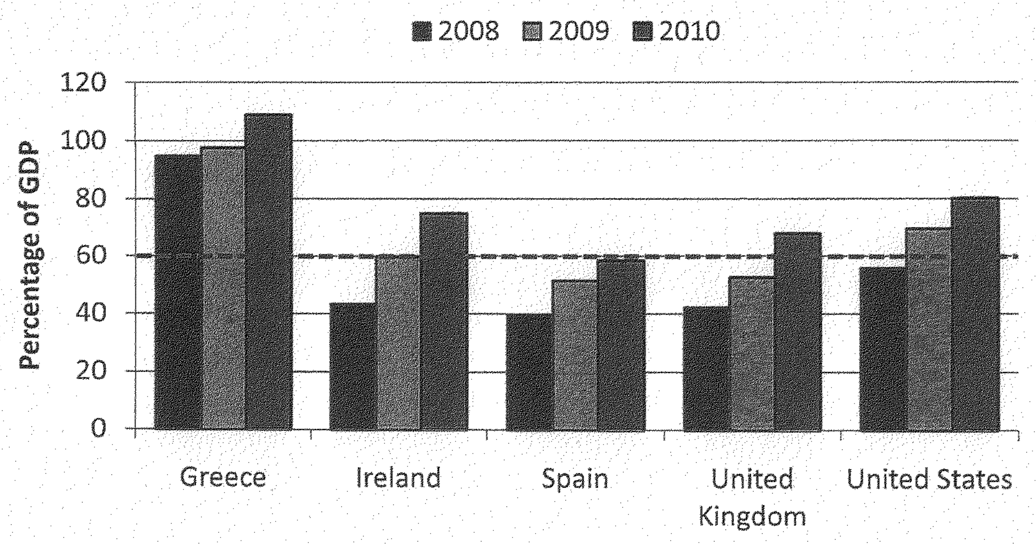
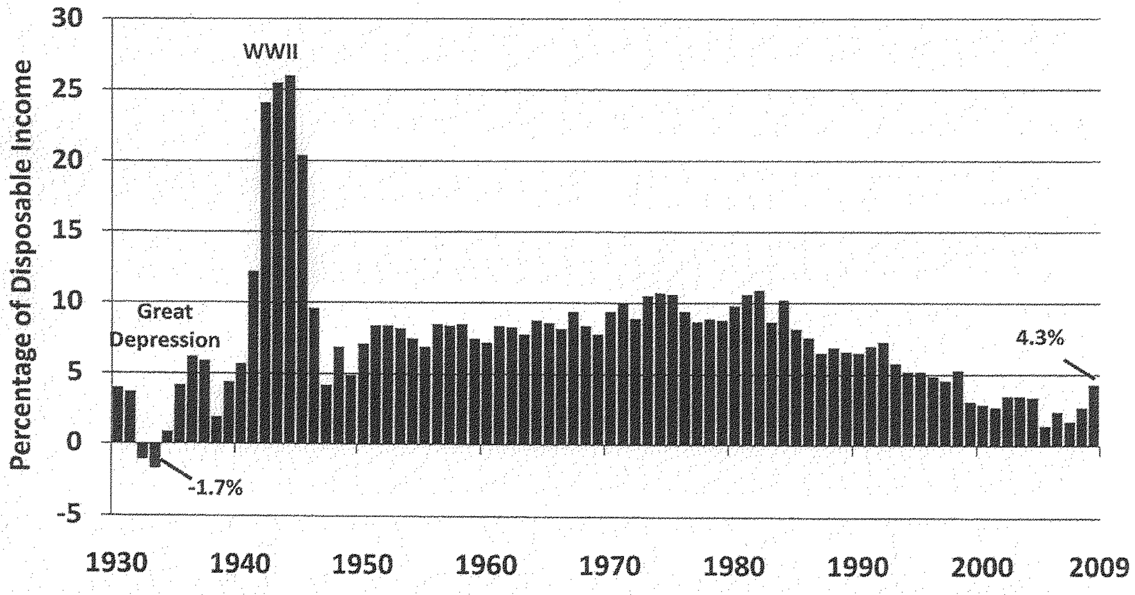
Public debt levels in the U.S are comparable to some of the financially troubled countries in Europe



NOTE: All 2009 and 2010 numbers are projections. Public debt here refers to state and local governmental debt as well as debt held by the public, or all federal debt held by individuals, corporations, state or local governments, and foreign entities.
SOURCE: International data from the International Monetary Fund. U.S. data from the Federal Reserve, *Flow of Funds Accounts of the United States;* and the Office of Management and Budget, *The 2011 Budget: Historical Tables.* Compiled by PGPF.

Exhibit XII

Current U.S. personal savings as a percent of disposable income has fallen to historically low levels



SOURCE: Data from Bureau of Economic Analysis, *Personal Income and Its Disposition:* February 2010. Compiled by PGPF.

Exhibit XIII

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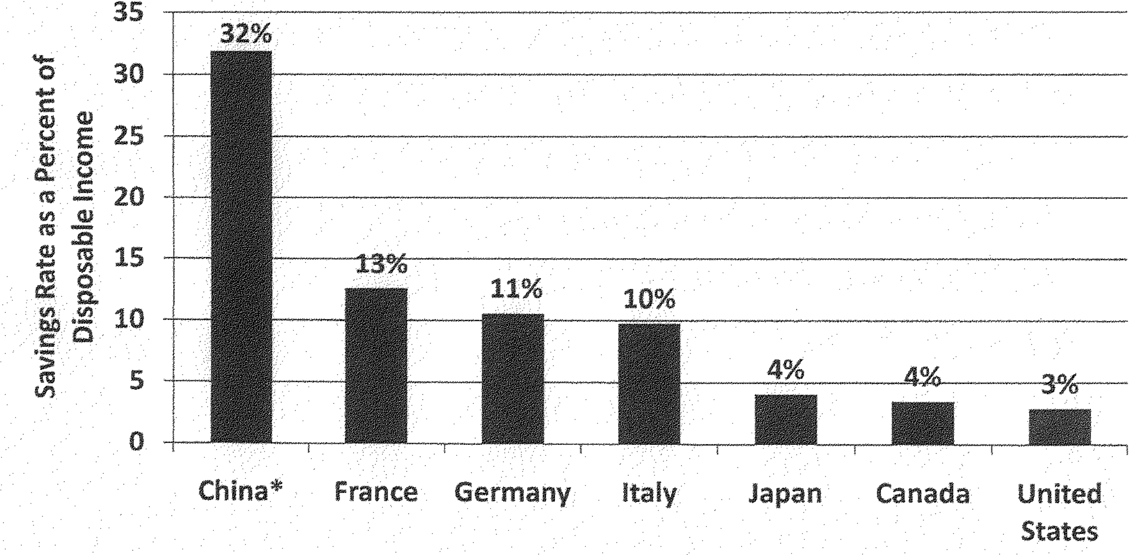
Among OECD countries, U.S. has the lowest average household savings rate as a percent of disposable income over 2000-2010 period



*Data for China actually reflects average across the period of 2000-2007.

SOURCE: Data from the OECD *Economic Outlook Volume 2009 Issue 2:* December 2009; CEIC *Flow of Funds* data, for China. Compiled by PGPF.

Exhibit XIV

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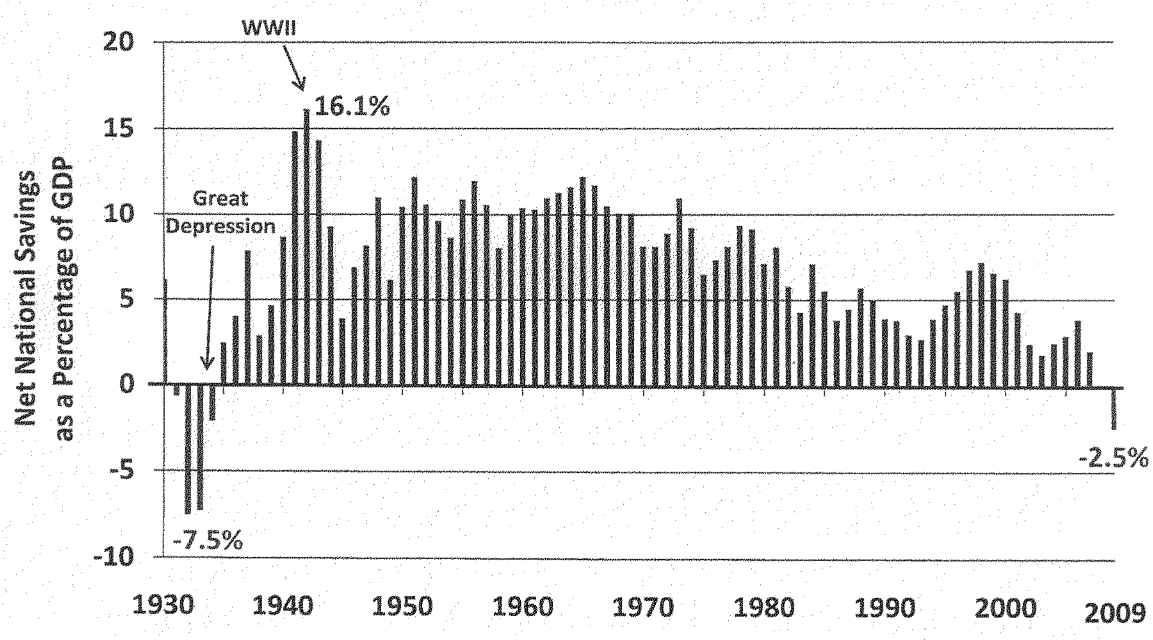
Our America. Our Future.

Current net national savings are at their lowest level since the Great Depression



SOURCE: Data from the Bureau of Economic Analysis, National Income and Product Accounts. Compiled by PGPF.

Exhibit XV

Peter G. Peterson Foundation
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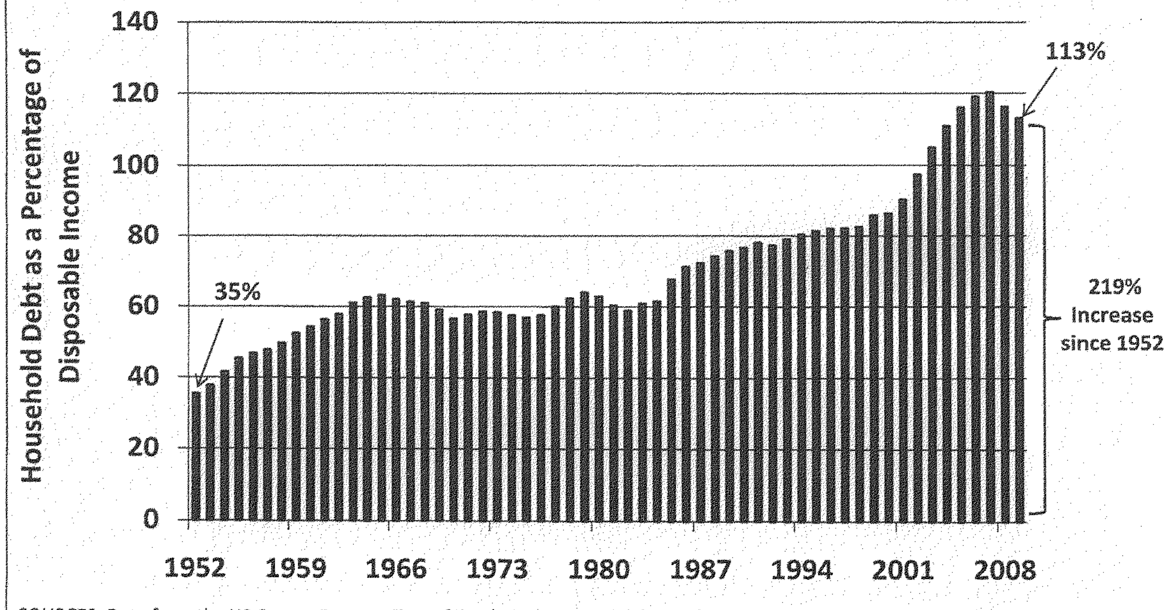
U.S. household debt has reached historically high levels as a percent of disposable Income

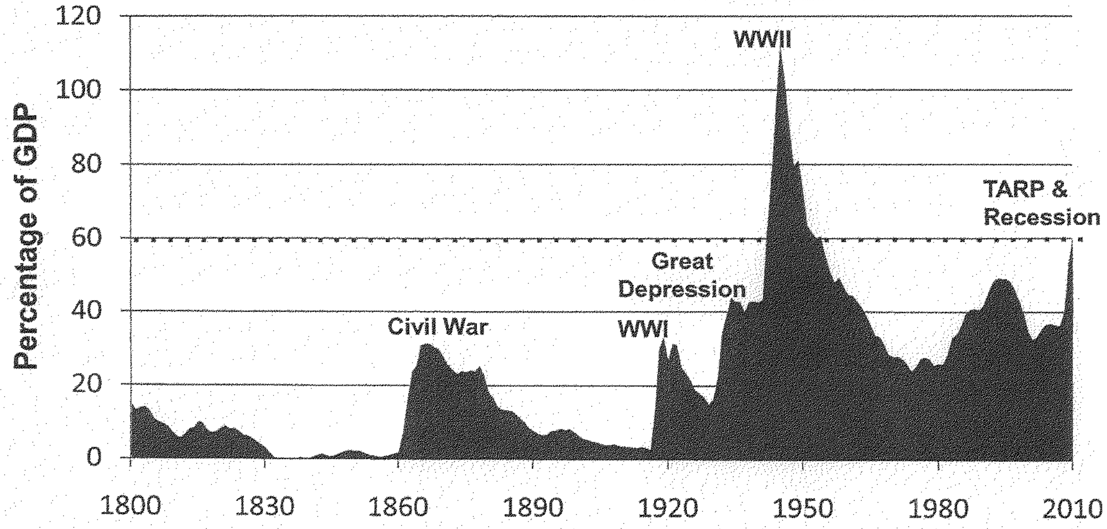


SOURCES: Data from the US Census Bureau, *Flow of Funds Accounts—Liabilities of Households and Nonprofit Organizations;* and Bureau of Economic Analysis, *Personal Income and Its Disposition*: February 2010. Compiled by PGPF.

Exhibit XVI

Peter G. Peterson Foundation
Our America. Our Future.

Since 1800, U.S. debt held by public has exceeded 60% of GDP only during World War II

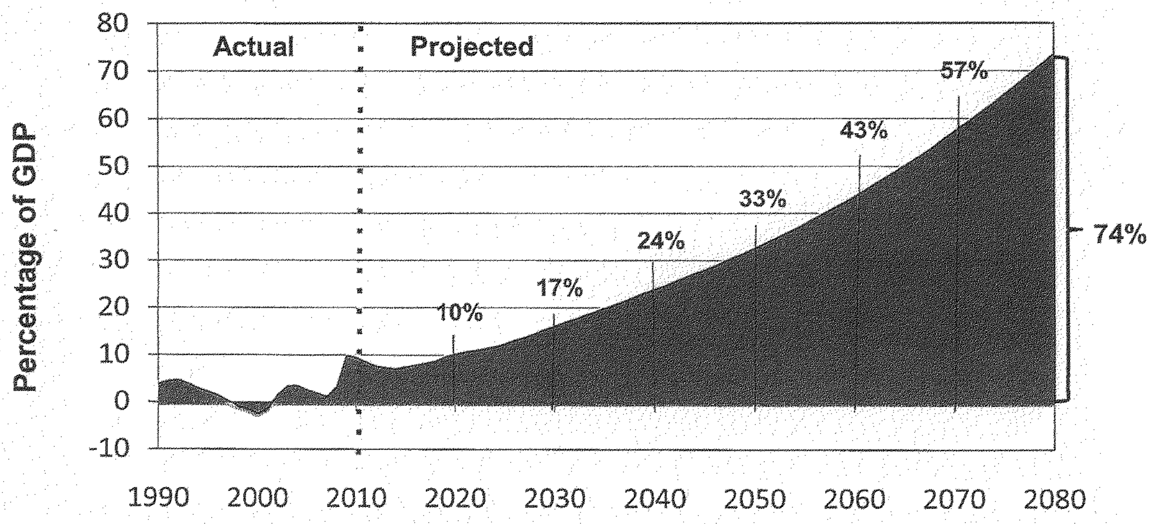


NOTE: Debt held by the public refers to all federal debt held by individuals, corporations, state or local governments, and foreign entities.
SOURCES: Data from the Congressional Budget Office, *Long-Term Budget Outlook: June 2009*, the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook*: January 2010 Update, alternative simulation using Congressional Budget Office assumptions. Compiled by PGPF.

Exhibit XVII

Peter G. Peterson Foundation
Our America. Our Future.

Under current policies, federal deficits (+) are projected to more than double as a percentage of GDP even after the economy recovers

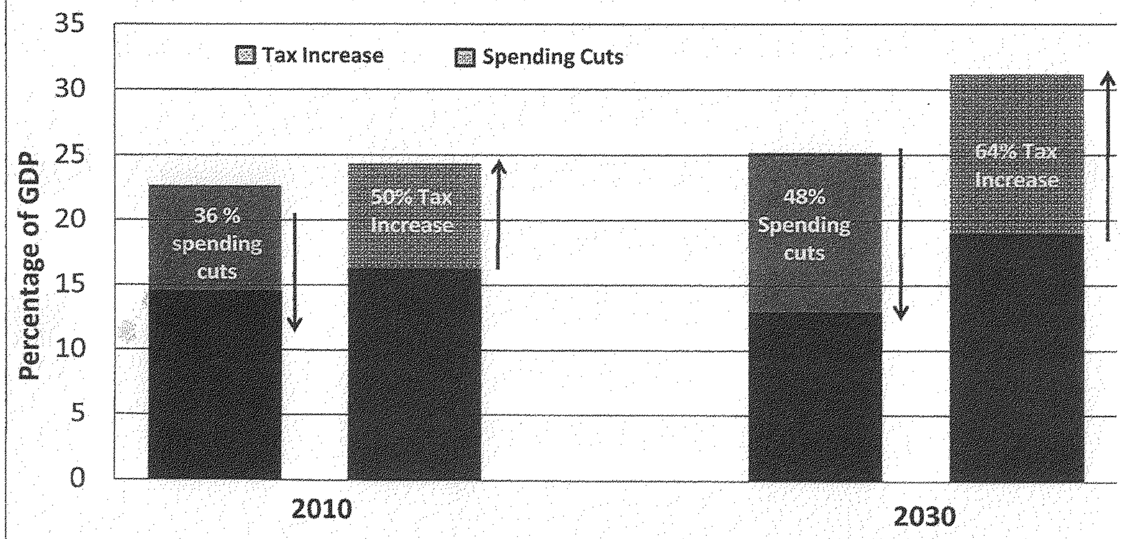


NOTE: Current policy estimates assume extension of the 2001 and 2003 tax cuts, alternative minimum tax (AMT) exemption amount is indexed to inflation, Medicare physician payments are not reduced, and discretionary spending grows with GDP.
SOURCES: Data the Office of Management and Budget, *A New Era of Responsibility: The 2011 Budget, Historical Tables*, February 2010, and the Government Accountability Office, *The Federal Government's Long-Term Fiscal Outlook*: January 2010 Update, alternative simulation using Congressional Budget Office assumptions. Compiled by PGPF.

Exhibit XVIII

Peter G. Peterson Foundation
Our America. Our Future.

If we wait to close the fiscal gap, by using spending cuts or tax increases alone, we would face more and more difficult choices in the future



NOTE: Spending refers to non-interest spending. The amounts shown are the non-interest spending cuts or tax increases from the projected levels required to close the projected fiscal gap by using only one or the other, not both. The fiscal gap refers to the reduction in spending or increase in taxes required to keep debt-to-GDP no higher than the 2010 level in 2085.
SOURCE: Data from the Congressional Budget Office, *Long-Term Budget Outlook*, June 2009. Compiled by PGPF.

Exhibit XIX

Federal Reserve Bank of New York
Staff Reports

Liquidity and Leverage

Tobias Adrian
Hyun Song Shin

Staff Report no. 328
May 2008
Revised January 2009

This paper presents preliminary findings and is being distributed to economists and other interested readers solely to stimulate discussion and elicit comments. The views expressed in the paper are those of the authors and are not necessarily reflective of views at the Federal Reserve Bank of New York or the Federal Reserve System. Any errors or omissions are the responsibility of the authors.

Liquidity and Leverage

Tobias Adrian and Hyun Song Shin

Federal Reserve Bank of New York Staff Reports, no. 328
May 2008; revised January 2009
JEL classification: E32, E44, G10, G20

Abstract

In a financial system in which balance sheets are continuously marked to market, asset price changes appear immediately as changes in net worth, eliciting responses from financial intermediaries who adjust the size of their balance sheets. We document evidence that marked-to-market leverage is strongly procyclical. Such behavior has aggregate consequences. Changes in dealer repos—the primary margin of adjustment for the aggregate balance sheets of intermediaries—forecast changes in financial market risk as measured by the innovations in the Chicago Board Options Exchange Volatility Index (VIX). Aggregate liquidity can be seen as the rate of change of the aggregate balance sheet of the financial intermediaries.

Key words: financial market liquidity, financial cycles, financial intermediary leverage

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Adrian: Federal Reserve Bank of New York (email: tobias.adrian@ny.frb.org). Shin: Princeton University (e-mail: hsshin@princeton.edu). A previous version of this paper was presented at the 6th Annual Bank for International Settlements (BIS) conference "Financial System and Macroeconomic Resilience," June 18-19, 2007, under its former title "Liquidity and Financial Cycles." The authors thank Elu von Thadden and two anonymous referees for their comments. They also thank participants at the BCBS (Basel Committee on Banking Supervision)- CEPR (Centre for Economic Policy Research)-JFI (*Journal of Financial Intermediation*) workshop "Risk Transfer Mechanisms and Financial Stability," May 29-30, 2008, as well as seminar participants at the Federal Reserve Bank of New York, the Federal Reserve Bank of Chicago, Princeton University, and Baruch College for their comments. The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

1. Introduction

In a financial system where balance sheets are continuously marked to market, changes in asset prices show up immediately on balance sheets, and have an instant impact on the net worth of all constituents of the financial system. The net worth of financial intermediaries are especially sensitive to fluctuations in asset prices given the highly leveraged nature of such intermediaries' balance sheets.

Our focus in this paper is on the reactions of the financial intermediaries to changes in their net worth, and the market-wide consequences of such reactions. If financial intermediaries were passive and did not adjust their balance sheets to changes in net worth, then leverage would fall when total assets rise. Change in leverage and change in balance sheet size would then be negatively related.

However, as we will see below, the evidence points to a strongly *positive* relationship between changes in leverage and changes in balance sheet size. Far from being passive, the evidence points to financial intermediaries adjusting their balance sheets actively, and doing so in such a way that leverage is high during booms and low during busts. That is, leverage is procyclical.

Procyclical leverage can be seen as a consequence of the active management of balance sheets by financial intermediaries who respond to changes in prices and measured risk. For financial intermediaries, their models of risk and economic capital dictate active management of their overall Value-at-Risk (VaR) through adjustments of their balance sheets.

From the point of view of each institution, decision rules that result in procyclical leverage are readily understandable. However, there are aggregate consequences of such behavior for the financial system as a whole that might not be taken into consideration by individual institutions. We exhibit evidence that procyclical leverage affects aggregate volatility and particularly the price of risk.

Our paper has two main objectives. Our first objective is to document the relationship between balance sheet size and leverage for security broker dealers -

financial intermediaries that operate primarily through the capital markets, and which included the major Wall Street investment banks. We show that leverage is strongly procyclical for these institutions and show that the margin of adjustment on the balance sheet is through repos and reverse repos. The first version of our paper was written in June 2007, just prior to the eruption of the financial crisis of 2007-8. Since then, the five major US investments banks that we analyze in the remainder of the paper have all left the broker dealer sector. Three of them - Bear Stearns, Lehman Brothers and Merrill Lynch were either taken over under distressed conditions or declared bankruptcy. The remaining two - Goldman Sachs and Morgan Stanley - converted to bank holding companies. Thus, in the short time period since the first version of this paper was written, the era of stand alone Wall Street investment banks has come to an end. Our paper represents a contemporaneous record of the last months of the once illustrious Wall Street investment banks.

Our second objective is to pursue the aggregate consequences of procyclical leverage and document evidence that expansions and contractions of balance sheets have asset pricing consequences through shifts in risk appetite. In particular, we show that changes in collateralized borrowing and lending on intermediary's balance sheet are significant forecasting variables for innovations in market-wide risk as measured by the VIX index of implied volatility in the stock market. We also decompose VIX innovations into changes of stock market volatility and changes of the difference between implied volatility and actual volatility (the volatility risk premium). We find that dealer balance sheet changes primarily forecast changes in the volatility risk premium, which has a natural interpretation as the price of risk.

Previous work has shown that innovations in market volatility are important cross-sectional pricing factors (see Ang, Hodrick, Xing, and Zhang (2006), and Adrian and Rosenberg (2008)), and that the volatility risk premium forecasts future equity returns (Bollerslev and Zhou (2007)). Our finding that fluctuations of the balance sheets of broker dealers forecast volatility innovations shows that intermediary balance sheets matter for the pricing of risk. In this way, our empirical results provide some backing to recent theoretical work on liquidity and asset pricing. Gromb and Vayanos (2002) draw on the theme in Shleifer and Vishny (1997) on the importance of collateral constraints for leveraged traders. Brunnermeier and Pedersen (2007) coined the term "margin spiral" where increased margins and falling prices reinforce market distress. He and Krishnamurthy (2008) show how intermediary capital matters in a dynamic asset pricing model. Our empirical results provide some context for this literature.

Our findings also shed light on the concept of "liquidity" as used in common discourse about financial market conditions. In the financial press and other market commentary, asset price booms are sometimes attributed to "excess liquidity" in the financial system. Financial commentators are fond of using the associated metaphors, such as the financial markets being "awash with liquidity", or liquidity "sloshing around". However, the precise sense in which "liquidity" is being used in such contexts is often left unspecified.

Our empirical findings suggest that financial market liquidity can be understood as the rate of growth of aggregate balance sheets. In response to increases in prices on the asset side of intermediaries' balance sheets, leverage falls, and intermediaries hold surplus capital. They will then search for uses of their surplus capital. In a loose analogy with manufacturing firms, we may see the financial system as having "surplus capacity". For such surplus capacity to be utilized, the intermediaries expand their balance sheets. On the liabilities side, they take on more short-term debt. On the asset side, they search for potential borrowers that they can lend to. Financial market liquidity is intimately tied to how hard the financial intermediaries search for borrowers.

The outline of our paper is as follows. We begin with a review of some very basic balance sheet arithmetic on the relationship between leverage and total assets. The purpose of this initial exercise is to motivate our empirical investigation of the balance sheet changes of financial intermediaries in section 3. Having outlined the facts, in section 4, we show that changes in aggregate repo positions of the major financial intermediaries can forecast innovations in the volatility risk-premium, where the volatility risk premium is defined as the difference between the VIX index and realized volatility. We conclude with discussions of the implications of our findings for funding liquidity.

2. Some Basic Balance Sheet Arithmetic

What is the relationship between *leverage* and *balance sheet size*? We begin with some very elementary balance sheet arithmetic, so as to focus ideas. Before looking at the evidence for financial intermediaries, let us think about the relationship between balance sheet size and leverage for a household. The household owns a house financed with a mortgage. For concreteness, suppose the house is worth 100, the mortgage value is 90, and so the household has net worth (equity) of 10. The initial balance sheet then is given by:

Assets	Liabilities
House 100	Equity 10 Mortgage 90

Leverage is defined as the ratio of total assets to equity, hence is $100/10 = 10$. What happens to leverage as total assets fluctuate? Denote by A the market value of total assets and E is the market value of equity. We make the simplifying assumption that the market value of debt stays roughly constant at 90 for small shifts in the value of total assets. Total leverage is then

$$L \simeq \frac{A}{A-90}$$

Leverage is inversely related to total assets. When the price of my house goes up, my net worth increases, and so my leverage goes down. Indeed, for households, the negative relationship between total assets and leverage is clearly borne out in the aggregate data. Figure 2.1 plots the quarterly changes in total assets to quarterly changes in leverage as given in the Flow of Funds account for the United States. The data are from 1963 to 2006. The scatter chart shows a strongly negative relationship, as suggested by a passive behavior toward asset price changes.

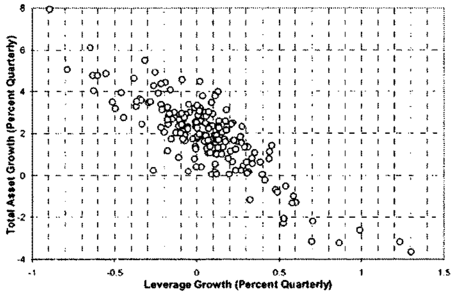

Figure 2.1: Total Assets and Leverage of Household

We can ask the same question for firms, and we will address this question for three different types of firms: non-financial firms, commercial banks and security brokers and dealers. If a firm were passive in the face of fluctuating asset prices, then leverage would vary inversely with total assets. However, the evidence points to a more active management of balance sheets.

Figure 2.2 is a scatter chart of the change in leverage and change in total assets of non-financial, non-farm corporations drawn from the U.S. flow of funds data (1963 to 2006). The scatter chart shows much less of a negative pattern, suggesting that companies react somewhat to changes in asset prices by shifting

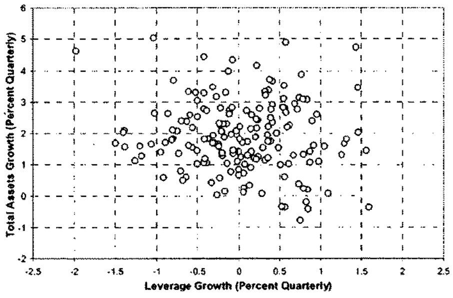

Figure 2.2: Total Assets and Leverage of Non-financial, Non-farm Corporates

their stance on leverage.[1] More notable still is the analogous chart for U.S. commercial banks, again drawn from the U.S. Flow of Funds accounts. Figure 2.3 is the scatter chart plotting changes in leverage against changes in total assets for U.S. commercial banks. A large number of the observations line up along the vertical line that passes through zero change in leverage. In other words, the data show the outward signs of commercial banks targeting a fixed leverage ratio.

However, even more striking than the scatter chart for commercial banks is that for security dealers and brokers, that include the major Wall Street investment banks. Figure 2.4 is the scatter chart for U.S. security dealers and brokers, again drawn from the Flow of Funds accounts (1963 - 2006). The alignment of the observations is now the reverse of that for households. There is a strongly *positive* relationship between changes in total assets and changes in leverage. In this sense, leverage is pro-cyclical.

In order to appreciate the aggregate consequences of procyclical leverage, let

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[1] This finding is consistent with Welch's (2004) analysis of non-financial leverage which demonstrates that 40 percent of leverage changes are (passively) explained by shocks to equity prices, and 60 percent by the net issuing activity.

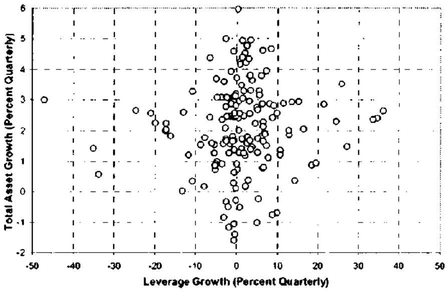

Figure 2.3: Total Assets and Leverage of Commercial Banks

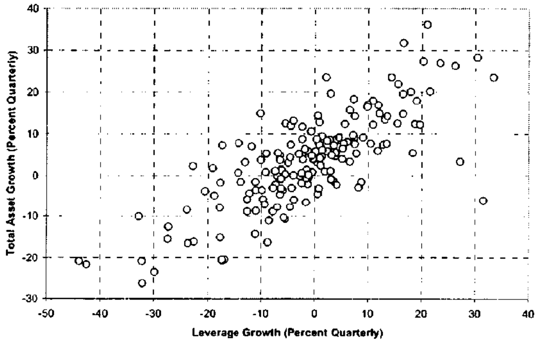

Figure 2.4: Total Assets and Leverage of Security Brokers and Dealers

us first consider the behavior of a financial intermediary that manages its balance sheet actively to as to maintain a *constant* leverage ratio of 10. The effects we describe below will be even larger for leverage that is procyclical. Suppose the initial balance sheet is as follows. The financial intermediary holds 100 worth of securities, and has funded this holding with debt worth 90.

Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

Assume that the price of debt is approximately constant for small changes in total assets. Suppose the price of securities increases by 1% to 101.

Assets	Liabilities
Securities, 101	Equity, 11
	Debt, 90

Leverage then falls to 101/11 = 9.18. The bank targets leverage of 10, and so takes on additional debt of D to purchase D worth of securities on the asset side so that

$$\frac{\text{assets}}{\text{equity}} = \frac{101 + D}{11} = 10$$

The solution is $D = 9$. The bank takes on additional debt worth 9, and with this money purchases securities worth 9. Thus, an increase in the price of the security of 1 leads to an increased holding worth 9. After the purchase, leverage is now back up to 10.

Assets	Liabilities
Securities, 110	Equity, 11
	Debt, 99

The mechanism works in reverse, too. Suppose there is shock to the securities price so that the value of security holdings falls to 109. On the liabilities side, it is equity that bears the burden of adjustment, since the value of debt stays approximately constant.

Assets	Liabilities
Securities, 109	Equity, 10
	Debt, 99

Leverage is now too high (109/10 = 10.9). The bank can adjust down its leverage by selling securities worth 9, and paying down 9 worth of debt. Thus, a *fall* in the price of securities of leads to *sales* of securities. The new balance sheet then looks as follows. The balance sheet is now back to where it started before the price changes. Leverage is back down to the target level of 10.

Assets	Liabilities
Securities, 100	Equity, 10
	Debt, 90

The perverse nature of the reactions to price changes are even stronger when the leverage of the financial intermediary is procyclical. When the securities price goes up, the upward adjustment of leverage entails purchases of securities that are even larger than that for the case of constant leverage. If there is the possibility of feedback, then the adjustment of leverage and price changes will reinforce each other in an amplification of the financial cycle.

If financial markets are not perfectly liquid so that greater demand for the asset tends to put upward pressure on its price, then there is the potential for a feedback effect in which stronger balance sheets feed greater demand for the asset, which in turn raises the asset's price and lead to stronger balance sheets. Figure 2.5 illustrates the feedback during a boom. The mechanism works exactly in

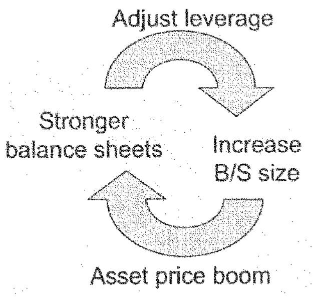

Figure 2.5: Leverage Adjustment in Upturn

reverse in downturns. If financial markets are not perfectly liquid so that greater supply of the asset tends to put downward pressure on its price, then there is the potential for a feedback effect in which weaker balance sheets lead to greater sales of the asset, which depresses the asset's price and lead to even weaker balance sheets. Figure 2.6 illustrates the feedback during a downturn.

In section 4, we return to the issue of feedback by exhibiting evidence that is consistent with the amplification effects sketched above. We will see that changes in key balance sheet components forecast changes in the VIX index of implied volatility in the stock market.

3. A First Look at the Evidence

3.1. Investment Bank Balance Sheets

To set the stage for our empirical study, we begin by examining the quarterly changes in the balance sheets of the (then) five major US investment banks, as listed below in Table 1. The data are from the regulatory filings with the U.S. Securities and Exchange Commission (SEC) on their 10-K and 10-Q forms.

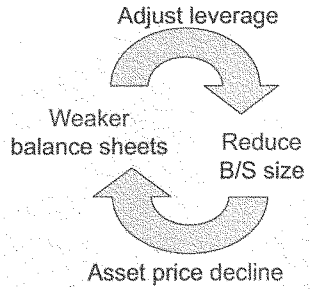

Figure 2.6: Leverage Adjustment in Downturn

Table 1: Investment Banks

Name	Sample
Bear Stearns	1997 Q1 – 2008 Q1
Goldman Sachs	1999 Q2 – 2008 Q1
Lehman Brothers	1993 Q2 – 2008 Q1
Merrill Lynch	1991 Q1 – 2008 Q1
Morgan Stanley	1997 Q2 – 2008 Q1

Our choice of these five banks is motivated by our concern to examine "pure play" investment banks that were not part of bank holding companies so as to focus attention on their behavior with respect to the capital markets[2]. Citigroup reported its investment banking operations separately from its commercial banking operations until 2004 as "Citigroup Global Markets", and we have data for the period 1998Q1 to 2004Q4. In some of our charts below, we will report Citigroup Global Markets for comparison. The stylized balance sheet of an investment bank is as follows.

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[2] Hence, we do not include JP Morgan Chase, Credit Suisse, Deutsche Bank, and other brokerage operations that are part of a larger bank holding companies.

Assets	Liabilities
Trading assets	Short positions
Reverse repos	Repos
Other assets	Long term debt
	Shareholder equity

On the asset side, traded assets are valued at market prices, or are short term collateralized loans (such as reverse repos) for which the discrepancy between face value and market value are very small due to the very short term nature of the loans. On the liabilities side, short positions are at market values, and repos are very short term borrowing. We will return to a more detailed descriptions of repos and reverse repos below. Long-term debt is typically a small fraction of the balance sheet for investment banks.[3] For these reasons, investment banks provide a good approximation of the balance sheet that is continuously marked to market, and hence provide insights into how leverage changes with balance sheet size.

The second reason for our study of investment banks lies in their increasing significance for the financial system until the financial crisis that led to the demise of the large investment banks. Figure 3.1 plots the size of securities firms' balance sheets relative to that of bank holding companies. We also plot the assets under management for hedge funds, although we should be mindful that "assets under management" refers to total investor equity, rather than the size of the balance sheet. To obtain total balance sheet size, we should multiply by hedge fund leverage (which is not readily available). Figure 3.1 shows that when expressed as a proportion of bank holding company balance sheets, securities firms had been increasing their balance sheets at a very rapid rate. Note that when hedge funds' assets under management is converted to balance sheet size by multiplying by a conservative leverage factor of 2, the combined balance sheets of investment banks

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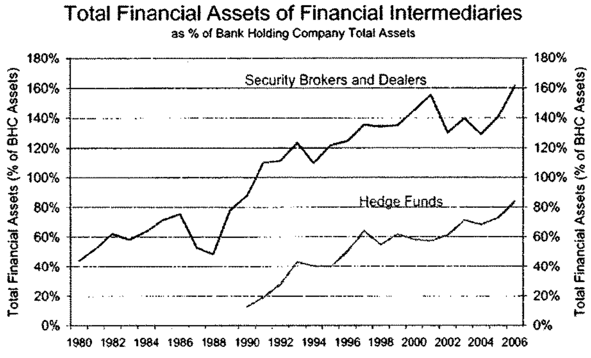
[3] The balance sheet of Lehman Brothers as of November 2005 shows that short positions are around a quarter of total assets, and long term debt is an even smaller fraction. Shareholder equity is around 4% of total assets (implying leverage of around 25). Short-term borrowing in terms of repurchase agreements and other collateralized borrowing takes up the remainder.



Total Financial Assets of Financial Intermediaries

as % of Bank Holding Company Total Assets

Source:

Total financial assets of Security Brokers and Dealers are from table L.129 of the Flow of Funds, Board of Governors of the Federal Reserve.

Total financial assets of Bank Holding Companies are from table L.112 of the Flow of Funds, Board of Governors of the Federal

Figure 3.1: Total Financial Intermediary Assets

and hedge funds overtook the bank holding company balance sheets in 1990, and became more that twice as large by 2007.

Size is not the only issue. When balance sheets are marked to market, the responses to price changes may entail responses that may be disproportionately large. LTCM's balance sheet was small relative to the total financial sector, but its impact would have been underestimated if only size had been taken into account. Similarly, the size of the sub-prime mortgage exposures was small relative to the liabilities of the financial system as a whole, but the credit crisis of 2007/2008 demonstrates that its impact can be large. Table 2 gives the summary statistics of the investment banks over the sample period.

We begin with the key question left hanging from the previous section. What is the relationship between leverage and total assets? The answer is provided in the scatter charts in figure 3.2. We have included the scatter chart for Citigroup Global Markets (1998Q1 - 2004Q4) for comparison, although Citigroup does not figure in the panel regressions reported below. The scatter chart shows the growth

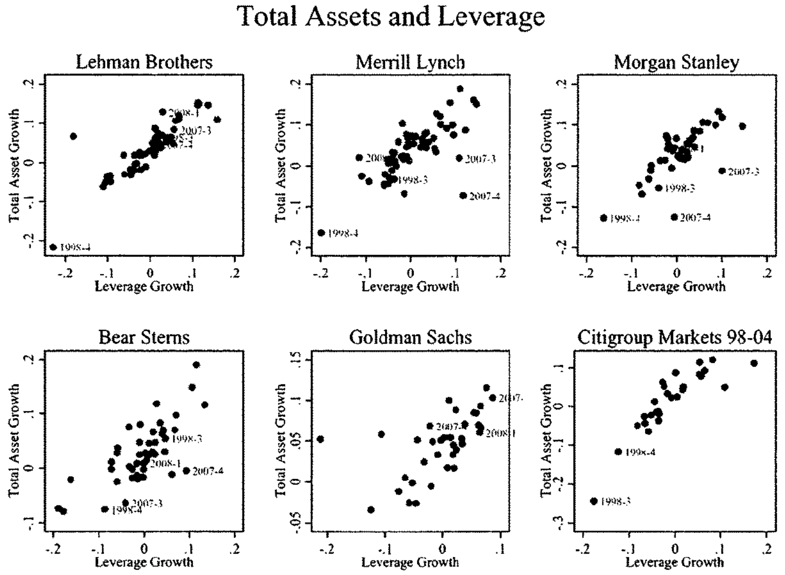


Figure 3.2: Total Assets and Leverage

in assets and leverage at a quarterly frequency. In all cases, leverage is large when total assets are large. Leverage is pro-cyclical.

There are some notable common patterns in the scatter charts, but also some notable differences. The events of 1998 are clearly evident in the scatter charts. The early part of the year saw strong growth in total assets, with the attendant increase in leverage. However, the third and fourth quarters of 1998 shows all the hallmarks of financial distress and the attendant retrenchment in the balance sheet. For most banks, there were very large contractions in balance sheet size in 1998Q4, accompanied by large falls in leverage. These points are on the bottom left hand corners of the respective scatter charts, showing large contractions in the balance sheet and decrease in leverage. Lehman Brothers and Merrill Lynch seem especially hard hit in 1998Q4.

However, there are also some notable differences. It is notable, for instance, that for Citigroup Global Markets, the large retrenchment seems to have happened in the third quarter of 1998, rather than in the final quarter of 1998. Such a retrenchment would be consistent with the closing down of the former Salomon Brothers fixed income arbitrage desk on July 6th 1998, following the acquisition of the operation by Travelers Group (later, Citigroup). Many commentators see this event as the catalyst for the sequence of events that eventually led to the demise of Long Term Capital Management (LTCM) and the associated financial distress in the summer and early autumn of 1998.[4]

Figure 3.3 aggregates the individual scatter charts by taking the asset-weighted average of changes in balance sheet size and leverage. The upward-sloping relationship between changes in assets and changes in leverage is clearer. The 45-degree line in the scatter chart corresponds to the combination of points where the total equity value remains constant. This is because leverage growth is defined as the log difference in assets minus log difference in equity. Hence, the 45 degree line corresponds to the points where the log difference in equity is zero. The set of points below the 45 degree line corresponds to the observations in which equity fell. This explains why the observations for the third and fourth quarters of 2007 appear below the 45 degree line, as banks announced credit losses on their mortgage portfolios. More interestingly, there is a striking contrast between what happened in 1998 following the LTCM crisis and the credit crisis of 2007/8. As of the first quarter of 2008, there had not been the same type of contraction of balance sheets as was observed in the 1998 crisis. This difference holds the key to several distinctive characteristics of the crisis of 2007/8, as shown by Adrian

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[4] The official account (BIS, 1999) is given in the report of the CGFS of the Bank for International Settlements (the so-called "Johnson Report"). Popular accounts, such as Lowenstein (2000) give a description of the background and personalities.

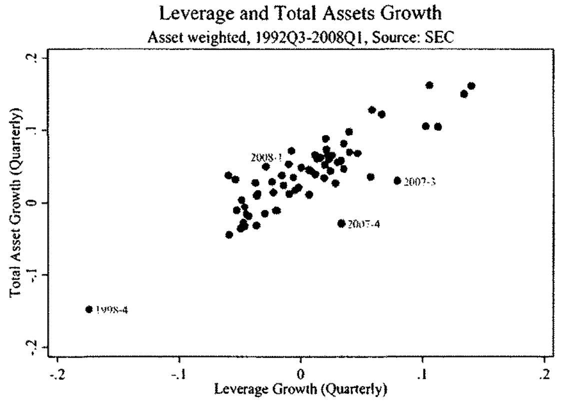

Figure 3.3: Aggregate Leverage and Total Asset Growth

and Shin (2008a) and Greenlaw et al. (2008).

Table 3 shows the results of a panel regression for change in leverage. The positive relationship between the change in leverage and change in total assets is confirmed in column (ii) of Table 3. The coefficient on lagged leverage (i.e. previous quarter's leverage) is negative, suggesting that leverage is mean-reverting. Leverage is negatively related to lagged Value-at-Risk (final column).

More interestingly, third column of Table 3 shows that the margin of adjustment in the fluctuations of balance sheets is through repos. In a repurchase agreement (repo), a financial institution sells a security on the understanding that it will buy it back at a pre-agreed price on a fixed future date. Such an agreement is tantamount to a collateralized loan, with the interest on the loan being the excess of the repurchase price over the sale price. From the perspective of the funds lender – the party who buys the security with the undertaking to re-sell it later – such agreements are called reverse repos. For the buyer, the transaction is

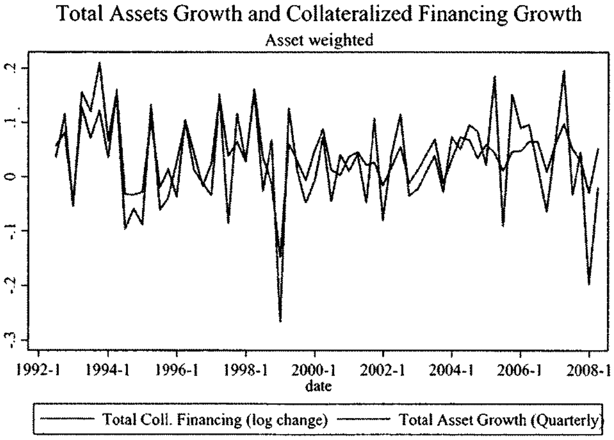

Figure 3.4: Total Asset and Total Repo Growth

equivalent to granting a loan, secured on collateral. In this way, adjustments in total assets and hence leverage show up as changes in repos, as is visible in chart 3.4.

Repos and reverse repos are important financing activities that provide the funds and securities needed by investment banks to take positions in financial markets. For example, a bank taking a long position by buying a security needs to deliver funds to the seller when the security is received on settlement day. If the dealer does not fully finance the security out of its own capital, then it needs to borrow funds. The purchased security is typically used as collateral for the cash borrowing. When the bank sells the security, the sale proceeds can be used to repay the lender.

Reverse repos are loans made by the investment bank against collateral. The bank's prime brokerage business vis-à-vis hedge funds will figure prominently in

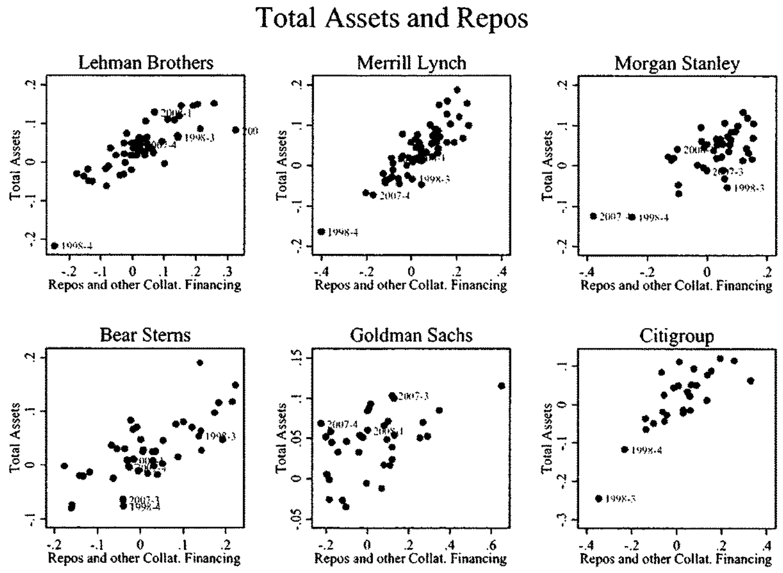

Figure 3.5: Total Assets and Repos

the reverse repo numbers. The scatter chart gives a glimpse into the way in which changes in leverage are achieved through expansions and contractions in the collateralized borrowing and lending. We saw in our illustrative section on the elementary balance sheet arithmetic that when a bank wishes to expand its balance sheet, it takes on additional debt, and with the proceeds of this borrowing takes on more assets. The expansion and contraction of total assets via repos is plotted in Figure 3.5.

Figure 3.5 plots the change in assets against change in collateralized borrowing for each of the investment banks. The positive relationship in the scatter plot confirms our panel regression finding that balance sheet changes are accompanied

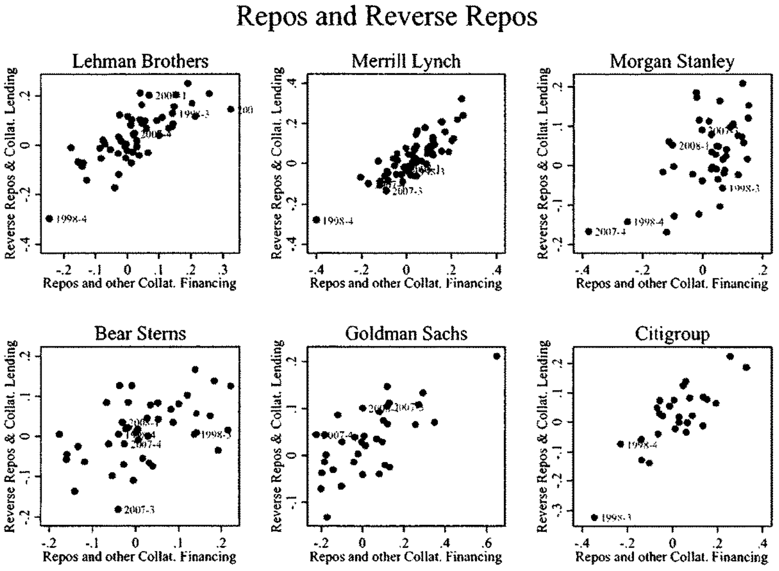

Figure 3.6: Repos and Reverse Repos

by changes in short term borrowing.

Figure 3.6 plots the change in repos against the change in reverse repos. A dealer taking a short position by selling a security it does not own needs to deliver the security to the buyer on the settlement date. This can be done by borrowing the needed security, and providing cash or other securities as collateral. When the dealer closes out the short position by buying the security, the borrowed security can be returned to the securities lender. The scatter plot in figure 3.6 suggests that repos and reverse repos play such a role as counterparts in the balance sheet.

3.2. Value-at-Risk

Procyclical leverage is not a term that the banks themselves are likely to use in describing what they do, although this is in fact what they are doing. To get a better handle on what motivates the banks in their actions, we explore the role of Value-at-Risk (VaR) in explaining the banks' balance sheet decisions.

For a random variable A, the *Value-at-Risk* at confidence level c relative to some base level A_0 is defined as the smallest non-negative number VaR such that

$$\text{Prob}\,(A < A_0 - VaR) \leq 1 - c$$

For instance, A could be the total marked-to-market assets of the firm at some given time horizon. Then the Value-at-Risk is the equity capital that the firm must hold in order to stay solvent with probability c. Financial intermediaries publish their Value-at-Risk numbers as part of their regulatory filings and in their annual reports. Their *economic capital* is tied to the overall Value-at-Risk of the whole firm, where the confidence level is set at a level high enough to target a given credit rating (typically A or AA).

If financial intermediaries adjust their balance sheets to target a ratio of Value-at-Risk to economic capital, then we may conjecture that their disclosed Value-at-Risk figures would be informative in reconstructing their actions. If the bank maintains capital K to meet total Value-at-Risk, then we have

$$K = \lambda \times VaR \tag{3.1}$$

where λ is the proportion of capital that the intermediary holds per unit of VaR. The proportionality λ is potentially time varying. Hence, leverage L satisfies

$$\begin{aligned} L &= \frac{A}{K} \\ &= \frac{1}{\lambda} \times \frac{A}{VaR} \\ &= \frac{1}{\lambda} \times \frac{1}{V} \end{aligned}$$

where V is the *unit value-at-risk*, defined as the value-at-risk per dollar of assets. Procyclical leverage then follows directly from the *counter*-cyclical nature of unit value-at-risk. The negative relationship between leverage and value-at-risk can also be seen in Table 3, column (v).

We can indeed see this counter-cyclical relationship in the data. In figure 3.7, we plot the unit value-at-risk against total assets, having removed the fixed effects for individual banks. We see that the relationship is downward sloping. We highlight 2007Q4 and 2008Q1 for Bear Stearns and Lehman Brothers, as they are clear outliers in the plot. The high levels of unit value-at-risk for these two investment banks leading up to the height of the credit crisis is suggestive of balance sheets that are under considerable stress. Shortly after filing its 10-Q form for the first quarter of 2008, Bear Stearns suffered its run, and was acquired by J.P. Morgan Chase with the assistance of the Federal Reserve. Lehman Brothers filed for bankruptcy in September of 2008.

In Figure 3.8 we plot the evolution of the average unit value-at-risk over time. We see again that the average unit value-at-risk increased sharply in 2007Q4 and 2008Q1.

Equation (3.1) also suggests that the ratio of Value-at-Risk to shareholder equity may be an informative series to track over time. The naive hypothesis would be that this ratio is kept constant over time by the bank. The naive hypothesis also ties in neatly the regulatory capital requirements under the 1996 Market Risk Amendment of the Basel capital accord. Under this rule, the regulatory capital is 3 times the 10 day, 99% Value-at-Risk.

In Figures 3.9 we plot the evolution of the VaR/equity ratio and leverage over time. The Value-at-Risk numbers are reported in the 10-K and 10-Q filings since 2001. We can see that both ratios—VaR/Equity and Leverage—are fairly constant before 2007, with the exception of Goldman Sachs, which exhibits a marked increase in leverage. In 2007, both leverage and the VaR/equity ratio

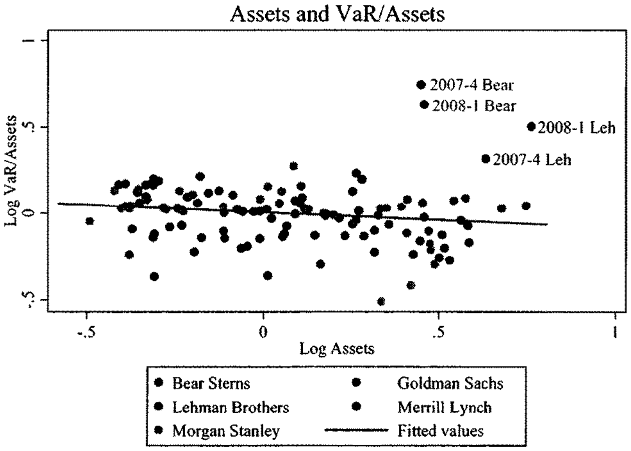

Figure 3.7: VaR and Total Assets

increased markedly for most banks. In Figure 3.10 we plot average leverage for all banks since 1992. There are two peaks in the evolution of leverage over time, one prior to the LTCM crisis of 1998, and a second peak in the run-up to the global financial crisis of 2007-8.

4. Forecasting Risk Appetite

We now explore the asset pricing consequences of balance sheet fluctuations. We exhibit empirical evidence that the waxing and waning of balance sheets have a direct impact on asset prices through the ease with which traders, hedge funds and other users of credit can obtain funding for trades.

So far, we have used quarterly data drawn either from the balance sheets of individual financial intermediaries or the aggregate balance sheet items from the

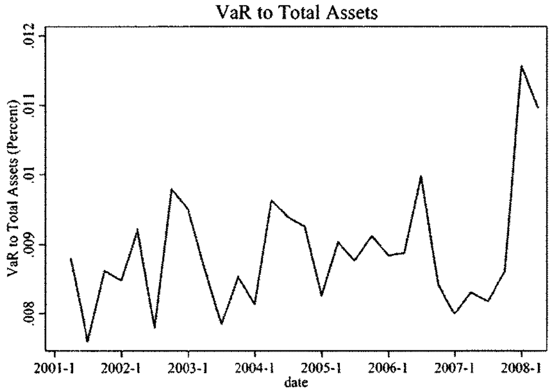

Figure 3.8: VaR to Total Assets (Percent)

Flow of Funds accounts. However, for the purpose of tracking the financial market consequences of balance sheet adjustments, data at a higher frequency are more useful. For this reason, we use the weekly data on the primary dealer repo and reverse repo positions compiled by the Federal Reserve Bank of New York. The primary dealer data have previously been analyzed by Adrian and Fleming (2005) and Kambhu (2006).

Primary dealers are security-broker dealers with whom the Federal Reserve has a trading relationship. The primary dealers include the (then) five investment banks studied above, as well as commercial and foreign banks that own broker-dealers.[5] The Federal Reserve collects transactions, positions, financing, and settlement data of the primary dealers in fixed income markets. The data are consolidated and released publicly on the Federal Reserve Bank of New York

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[5] A list of current primary dealers can be found at:
http://www.newyorkfed.org/markets/pridealers_current.html.

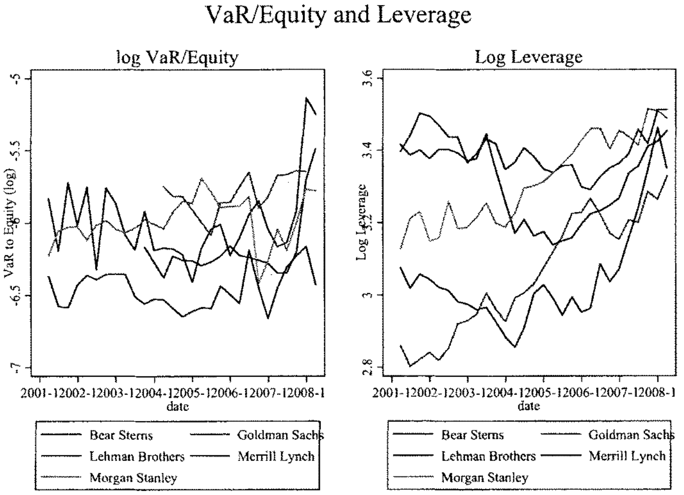

Figure 3.9: VaR/Equity and Leverage

website[6]. The primary dealer data provide a valuable window on the overall market, at a frequency (every week) that is much higher than the usual quarterly reporting cycle. Dealers collect information on their financing activities each Wednesday; summary data is released each Thursday, one week after they are collected. The data are aggregated across all dealers, and are only available by asset class.

Repos and reverse repos are a subset of the security financing data. Financing distinguishes between "securities in" and "securities out" for each asset class. "Securities in" refer to securities received by a dealer in a financing arrangement, whereas "securities out" refer to securities delivered by a dealer in a financing

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[6] www.newyorkfed.org/markets/primarydealers.html

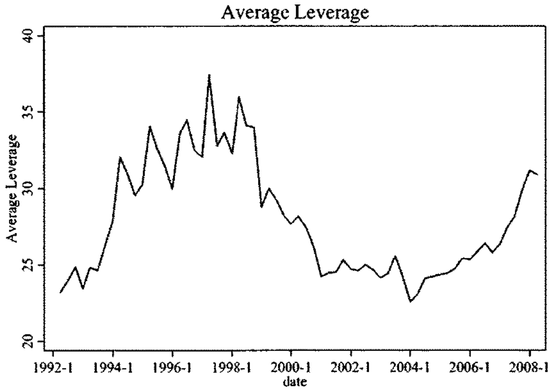

Figure 3.10: Average Leverage over Time

arrangement. For example, if a dealer enters into a repo, in which it borrows funds and provides securities as collateral, it would report securities out. Repos and reverse repos are reported across all sectors. Adrian and Fleming (2005) provide more detail about the data, and see Duffie (1996) and Fleming and Garbade (2003) for further details about repo markets.

We use the weekly repo and reverse repo data to forecast financial market conditions in the following week. Our measure of financial market conditions is the VIX index of implied volatility in S&P500 index options. The VIX index reflects aggregate financial market volatility, as well as the price of risk of market volatility. Ang, Hodrick, Xing, and Zhang (2006) show that VIX innovations are significant pricing factors for the cross section of equity returns, and Bollerslev and Zhou (2007) show that the volatility risk premium —the difference between the VIX and realized volatility of the S&P500 index — forecasts equity returns better than other commonly used forecasting variables (such as the P/E ratio or the term spread). We provide summary statistics of the primary dealer data, and the volatility data in Table 4.

We use the daily VIX data from the website of the Chicago Board Options Exchange (www.cboe.com/micro/vix), and compute the S&P500 volatility from daily data over weekly windows. We compute the volatility risk premium as the difference between implied volatility and realized volatility. This risk premium is closely linked to the payoff to volatility swaps, which are zero investment derivatives that return the difference between realized future volatility and implied volatility over the maturity of the swap (see Carr and Wu (2007) for an analysis of variance and volatility swaps). We then compute averages of the VIX and the variance risk premium over each week (from the close of Wednesday to the close of the following Tuesday).

The growth rate of repos on dealers' balance sheets significantly forecast innovations in the VIX. This can be seen in column (ii) of Table 5, where we report forecasting regressions for VIX changes over the next week. The forecasting results are significant at the 1% level. The forecasting R^2 increases from 4.9% when only the past VIX level is used, to 9% when repo changes are included in the forecast (comparison of columns i and ii). We believe the latter result (the significant forecasting power of dealer's repo growth for innovations in implied volatility) to be important. The forecasting result also holds for reverse repos, consistent with the notion that it is the total size of the balance sheet that matters for aggregate liquidity (column ii).

In order to gain a better understanding what is determining the forecasting result, we also run the forecasting regressions for S&P500 volatility and the volatility risk premium (columns v-viii). We see that it is the volatility risk premium that is being forecast, not actual equity volatility. Adjustments to the size of financial intermediary balance sheets via repos thus forecasts the price of risk of aggregate volatility, rather than aggregate volatility itself. We provide a graphical

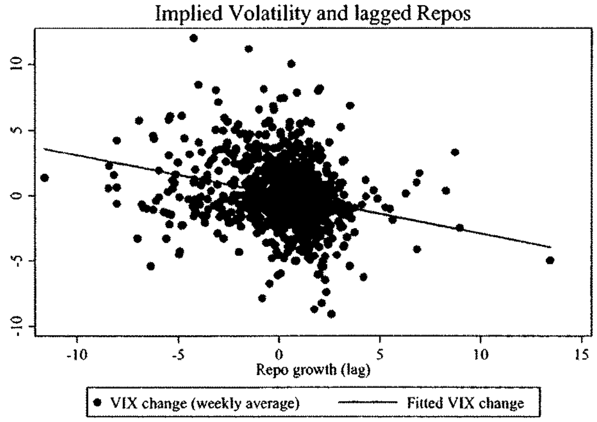

Figure 4.1: Implied Volatility and lagged Repos

illustration of the forecasting power of repos as a scatter chart in figure 4.1.

We can put forward the following economic rationale for the forecasting regressions presented here. When balance sheets expand through the increased collateralized lending and borrowing by financial intermediaries, the newly released funding resources chase available assets for purchase. More capital is deployed in increasing trading positions through the chasing of yield, and the selling of the "tails", as in the selling volatility via options. If the increased funding for asset purchases result in the generalized increase in prices and risk appetite in the financial system, then the expansion of balance sheets will eventually be reflected in the asset price changes in the financial system - hence, the ability of changes in repo positions to forecast future volatility, and particularly the volatility risk premium.

Finally, we may expect that balance sheet changes will have an impact on real variables also, such as the components of GDP. This is confirmed in Adrian and

Shin (2008b), who study implications for the conduct of monetary policy. We do not pursue this issue further here, for lack of space.

5. Other Related Literature

Our results add to the literature on the role of liquidity in asset pricing. Gennotte and Leland (1990) and Geanakoplos (2003) provide early analyses that are based on competitive equilibrium. As well as those mentioned in the opening to our paper, recent contributions to the role of liquidity in asset pricing include Allen and Gale (2004), Acharya and Pedersen (2005), Brunnermeier and Pedersen (2005, 2007), Morris and Shin (2004) and Acharya, Shin and Yorulmazer (2007a, 2007b)). The common thread is the relationship between funding conditions and the resulting market prices of assets. Closely related is the literature examining financial distress and liquidity drains.

The managing of leverage is closely to the bank's attempt to target a particular credit rating. To the extent that the "passive" credit rating should fluctuate with the financial cycle, the fact that a bank's credit rating remains constant through the cycle suggests that banks manage their leverage actively, so as to shed exposures during downturns. Kashyap and Stein (2003) draw implications from such behavior for the pro-cyclical impact of the Basel II bank capital requirements.

More broadly, our discussion here is related to the large literature on the amplification of financial shocks through balance sheet channels. The literature has distinguished two distinct channels. The first is the increased credit that operates through the *borrower's* balance sheet, where increased lending comes from the greater creditworthiness of the borrower (Bernanke and Gertler (1989), Kiyotaki and Moore (1997, 2005)). The second is the channel that operates through the *banks'* balance sheets, either through the liquidity structure of the banks' balance sheets (Bernanke and Blinder (1988), Kashyap and Stein (2000)), or the cushioning effect of the banks' capital (Van den Heuvel (2002)). Our discussion is closer to the latter group in that we also focus on the intermediaries' balance sheets. However, the added insight from our discussions is on the way that marking to market enhances the role of market prices, and the responses that price changes elicit from intermediaries.

The impact of remuneration schemes on the amplifications of the financial cycle have been addressed recently by Rajan (2005). The agency problems within a financial institution holds important clues on how we may explain procyclical behavior. Stein (1997) and Scharfstein and Stein (2000) present analyses of the capital budgeting problem within banks in the presence of agency problems.

The possibility that a market populated with Value-at-Risk (VaR) constrained traders may have more pronounced fluctuations has been examined by Danielsson, Shin and Zigrand (2004). Mark-to-market accounting may at first appear to be an esoteric question on measurement, but we have seen that it has potentially important implications for financial cycles. Plantin, Sapra and Shin (2008) present a microeconomic model that compares the performance of marking to market and historical cost accounting systems.

6. Concluding Remarks

Aggregate liquidity can be understood as the rate of growth of the aggregate financial sector balance sheet. When asset prices increase, financial intermediaries' balance sheets generally become stronger, and—without adjusting asset holdings—their leverage tends to be too low. The financial intermediaries then hold surplus capital, and they will attempt to find ways in which they can employ their surplus capital. In analogy with manufacturing firms, we may see the financial system as having "surplus capacity". For such surplus capacity to be utilized, the intermediaries must expand their balance sheets. On the liability side, they take on more short-term debt. On the asset side, they search for potential borrowers. Aggregate liquidity is intimately tied to how hard the financial intermediaries search for borrowers. In the sub-prime mortgage market in the United States we have seen that when balance sheets are expanding fast enough, even borrowers that do not have the means to repay are granted credit—so intense is the urge to employ surplus capital. The seeds of the subsequent downturn in the credit cycle are thus sown.

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Table 2: Investment Bank Summary Statistics

This Table reports aggregate balance sheet items for the five investment banks of Table 1. In Panel A, we report time series summary statistics for the cross sectional average of the balance sheet items. In Panel B, we report the summary statistics of quarterly grwoth rates which are weighted by the total assets cross sectionally.

Panel A: US$ Millions	Mean	Std Dev	Min	Median	Max	Obs
Total Assets	344599	217085	97302	287562	901397	65
Total Liabilities	330937	208964	93111	275719	871561	65
Equity	13289	8365	4190	10988	30920	65
Reverse Repos and other Collateralized Lending	134923	80723	34216	116731	323802	65
Reverse Repos	64368	30615	19097	55911	140054	65
Repos and other Collateralized Borrowing	105948	60501	29423	89189	263724	65
Repos	98474	41596	54682	83227	202372	53
Trading VaR	49	17	29	45	92	29

Panel B: Quarterly Growth	Mean	Std Dev	Min	Median	Max	Obs
Total Assets	4%	5%	-15%	4%	16%	64
Total Liabilities	4%	5%	-15%	4%	17%	64
Equity	3%	3%	-5%	3%	8%	64
Reverse Repos and other Collateralized Lending	4%	7%	-19%	3%	21%	64
Reverse Repos	3%	9%	-16%	3%	28%	64
Repos and other Collateralized Borrowing	3%	9%	-26%	4%	21%	64
Repos	2%	9%	-19%	1%	19%	53
Trading VaR	4%	9%	-25%	3%	19%	28

Table 3: Leverage Regressions

This table reports panel regressions of quarterly leverage growth rates on the lagged level of leverage, the growth rates of trading VaRs, the growth rates of repos, and the growth rates of total assets. Leverage is computed from the balance sheets of the five investment banks from Table 1 whose summary statistics are reported in Table 2. Leverage is defined as the ratio of total assets to book equity. All of the balance sheet data is from the 10-K and 10-Q filings of the banks with the Security and Exchange Commission. P-values are adjusted for autocorrelation and heteroskedasticity.

		Leverage (quarterly growth)			
		(i)	(ii)	(iv)	(v)
Leverage (log lag)	coef	-0.08	-0.04	-0.07	-0.02
	p-value	0.00	0.02	0.04	0.82
Total Assets (quarterly growth)	coef		0.83		
	p-value		0.00		
Repos (quarterly growth)	coef			0.22	
	p-value			0.00	
Trading VaR (quarterly growth, lag)	coef				-0.06
	p-value				0.01
Constant	coef	0.28	0.09	0.21	0.07
	p-value	0.00	0.06	0.04	0.77
Observations		235	235	196	109
Number of banks		5	5	5	5
R-squared		5%	62%	24%	5%
Fixed Effects		yes	yes	yes	yes

Table 4: Primary Dealer Financing Summary Statistics

This Table reports summary statistics of collateralized financing by the Federal Reserve's Primary Dealers from form FR2004 for January 3, 1990 - April 2, 2008.

Panel A: US$ Billions	Mean	Std Dev	Min	Max	Obs
Reverse Repos and other Collateralized Lending	1708	1026	397	4227	926
Reverse Repos	1252	702	332	2972	926
Repos and other Collateralized Borrowing	1792	1087	382	4616	926
Repos	1736	1086	369	4567	926
Net Repos	484	396	21	1600	926

Panel B: Weekly Growth	Mean	Std Dev	Min	Max	Obs
Reverse Repos and other Collateralized Lending	17%	207%	-1075%	1266%	925
Reverse Repos	19%	265%	-1410%	1471%	925
Repos and other Collateralized Borrowing	18%	215%	-1076%	1360%	925
Repos	19%	222%	-1159%	1344%	925
Net Repos	40%	437%	-2429%	5356%	925

Table 5: Forecasting Volatility

This table reports forecasting regressions of VIX implied volatility changes, S&P500 volatility changes, and the volatility risk premium on lagged growth rates of repo, reverse repo, and net repo positions of U.S. Primary Dealers. The VIX is computed from the cross section of S&P500 index option prices by the Chicago Board of Options Exchange. We compute weekly volatility from S&P500 returns. The volatility risk premium is the difference between the average VIX over the week and S&P500 volatility for the same week. Summary statistics of the Primary Dealer financing data are given in Table 4. The data is weekly from January 3, 1990 - April 2, 2008. P-values are adjusted for autocorrelation and heteroskedasticity.

		Implied Volatility (Change)				Volatility (Change)		Volatility Risk Premium (Change)	
		One week average							
		(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Implied Volatility	coef	-0.10	-0.09	-0.09	-0.10	-0.45	-0.45	-0.81	-0.81
(lag)	p-value	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Repos	coef		-0.28				0.01		-0.21
(lagged growth)	p-value		0.00				0.89		0.05
Reverse Repos	coef			-0.24					
(lagged growth)	p-value			0.00					
Net Repos	coef				-0.06				
(lagged growth)	p-value				0.00				
Constant	coef	1.95	1.85	1.82	1.93	4.99	4.96	6.50	6.52
	p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-squared (adj.)		4.9%	9.0%	9.1%	5.5%	22.3%	22.0%	40.3%	41.0%

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MEMORANDUM May 4, 2010

To: House Committee on Financial Services
Attention: Glen Sears

From: Edward Murphy, Specialist in Financial Economics, 7-6201
Mark Jickling, Specialist in Financial Economics, 7-7784

Subject: **Leverage, the Panic, and Financial Reform**

This memorandum responds to your request for an overview of the role of leverage in financial crises, recent trends in financial leverage across the different sectors of the U.S. economy, and elements of current regulatory reform legislation that would constrain leverage.[1] If more information is needed, please contact either of the authors at the numbers above.

Leverage and Financial Instability

The term leverage typically refers to the degree to which activity is financed by debt, rather than equity. The intensity and frequency of financial crises may be affected by the amount of leverage in the system. Greater debt implies greater leverage.[2] The reasoning behind this view is that economic fluctuations are more likely to cause highly leveraged firms, households, and governments to fail to repay their debts. Debt payments are typically fixed amounts due at pre-specified times,[3] and if economic conditions unexpectedly worsen, those who are highly leveraged will find it increasingly difficult to meet fixed debt payments and may be forced to go bankrupt or enter receivership. By contrast, payments to equity holders (such as stock dividends) may be suspended or reduced at the firm's discretion so that firms may continue in business if the owners are willing to ride out current losses. The more that activity has been financed with loans, the more activity could be disrupted. Risks to the broader economy may also be greater when leveraged financial intermediaries experience losses compared to other sectors of the economy.

The leverage of financial intermediaries may have a multiplied effect because of other sectors' reliance on them for credit. Leverage in the banking system may tend to reinforce good times and bad; that is, leveraged banks may increase the availability of easy credit during good times and magnify losses in bad times.

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[1] Some of the information and analysis included in this memorandum may be included in future CRS products.

[2] Debt is not the only way to create leverage. Options, derivatives and other financial instruments can allow people to increase their potential return and the risks that they take for a given amount of capital initially put forward.

[3] Chairman Bernanke includes monitoring the amount of leverage in the economy as an important element of the agenda for a macro-prudential regulator. See, for example, "Lessons of the Financial Crisis for Banking Supervision," speech before the Federal Reserve Bank of Chicago Conference on Bank Structure and Competition, Chicago, Illinois, May 7, 2009, available at http://www.federalreserve.gov/newsevents/speech/bernanke20090507a.htm.

This pro-cyclicality of financial leverage occurs in part because the immediate effect of a loan default is to reduce the lenders' capital, which increases leverage for a given level of debt. Lenders try to restore balance by raising new capital or reducing their own lending. But, lending must be curtailed by an amount that is a multiple of the capital losses to restore the pre-default leverage ratio. During the lead-up to the recent financial crisis, the U.S. Monetary Policy Forum estimated that $250 billion in mortgage-related losses to leveraged intermediaries would "...imply a $2.3 trillion contraction in intermediary balance sheets, of which roughly $1 trillion would represent a decline in lending to households, businesses, and other non-levered entities."[4]

Historical investigations into financial history provide some evidence supporting the view that leveraged institutions have played a significant role in financial crises. In their review of U.S. monetary history, Milton Friedman and Anna Schwartz found that recessions tended to be much more severe if accompanied by waves of bank failures.[5] In their review of historical financial crises around the world, Rogoff and Reinhardt found that many crises were preceded by rising debt levels.[6] In a series of recent papers, Anna Reinhart and Kenneth Rogoff emphasized the role of sovereign debt (debt issued by national governments), and noted that banking panics are typically followed by sharp increases in national debt. During the period leading up to the financial panic of September 2008, leverage in the United States increased substantially in the financial sector and among households. Leverage of the federal government was rising during the housing boom but at a slower rate than among households or the financial sector. Leverage in all sectors sometimes took the form of short-term obligations that would require continued access to credit markets in order to be rolled over.[7] Subsequent to the financial panic that occurred in September 2008, deficits of many governments around the world, including the United States, have risen in a way consistent with the Reinhart and Rogoff view.

Measuring Leverage

The Organization for Economic Cooperation and Development (OECD) defines leverage as "having exposure to the full benefits arising from holding a position in a financial asset, without having to fully fund the position with own funds."[8] There are many ways to measure leverage. Investors in corporate securities typically look at debt ratios (debt ÷ assets), debt-to-equity ratios (debt ÷ shareholders' equity), interest coverage ratios (earnings before interest and taxes ÷ interest expenses), and a range of other indicators. Financial leverage is distinguished from operating leverage. All these indicators are highly sensitive to accounting rules that may vary from industry to industry due to slight differences in interpretation and application. Given the recent financial crisis, measures of leverage in the financial services industry are the focus of this memorandum, but broad measures of household and government debt are also presented.

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[4] David Greenlaw et al, "Leveraged Losses: Lessons from the Mortgage Market Meltdown", U.S. Monetary Policy Report #2, U.S. Monetary Policy Forum, March 2008, available at http://faculty.chicagobooth.edu/anil.kashyap/research/MPFReport-final.pdf.

[5] Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867-1960* (Princeton, Princeton University Press, 1963), p. 677.

[6] Kenneth Rogoff and Carmen Reinhart, "This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises", Harvard Faculty Working Paper, April 16, 2008, available at http://www.economics.harvard.edu/files/faculty/51_This_Time_Is_Different.pdf

[7] Borrowers using nontraditional mortgages with introductory periods, hybrid adjustable rates (so called 2/28s), and similar provisions often intended to refinance their loans after a short period of time. Local governments relied on continued access to markets for their debts when they turned increasingly to auction rate securities. See CRS Report RL 34762, *Auction Rate Securities*, by D. Andrew Austin.

[8] OECD glossary of statistical terms, available at http://stats.oecd.org/glossary/detail.asp?ID=1524.

Leverage among financial institutions varies by type of institution. Safety and soundness regulators require banks and other covered institutions to hold specified levels of capital to cushion against losses. Such capital requirements are generally set as a percentage of assets, adjusted for the risk.

One definition of leverage is based on the amount of core capital that the institution maintains.[9] **Table 1** shows that the core capital ratio varies among institutions insured by the FDIC. International banks hold the smallest amount of core capital (are the most highly leveraged on average) and credit card lenders hold the most core capital (are the least leveraged on average) among this group. One reason for this may be that credit card lenders have larger concentrations of relatively high risk loans which require higher risk-based capital.

Table 1: Core Capital (Leverage) Ratio Among FDIC Depositories, 4Q 2009

International Banks	7.0%	Consumer Lenders	10.6%
All Other > $1 Billion in Assets	8.2%	All Other < $1 Billion in Assets	10.7%
Commercial Lenders	8.7%	Other Specialized < $1 Billion in Assets	15.6%
Mortgage Lenders	9.0%	Credit Card Lenders	19.6%
Agricultural banks	10.0%		

SOURCE: FDIC Quarterly Banking Profile, Fourth Quarter 2009
http://www2.fdic.gov/qbp/2009dec/grbookbw/QBPGRBW.pdf

The conceptual and definitional issues of leverage are complicated by innovations in finance, such as securitization, derivatives, and off-balance sheet entities, which enable firms to manage (some would say conceal) leverage. Therefore, it is not clear that there is a single leverage ratio that would permit meaningful comparisons across sectors of the economy.

Trends in Leverage, 1978—2009

To help identify and illustrate broad, long-term trends in all sectors, one might look at total borrowing. The figures below present data from the Federal Reserve's Flow of Funds accounts, on borrowing by households, nonfinancial nonfarm corporations, governments (federal and state and local), and the financial sector. **Figure 1** shows 32-year trends in total debt outstanding by sector. The sectoral contrasts are striking: state and local governments and nonfinancial corporations have maintained levels of debt that have been fairly constant as a percentage of gross domestic product (GDP).[10] Federal government debt increased in the eighties, then declined during part of the nineties, then began rising again in the 00s. The household and financial sectors, on the other hand, show marked increases in leverage throughout the period.

---

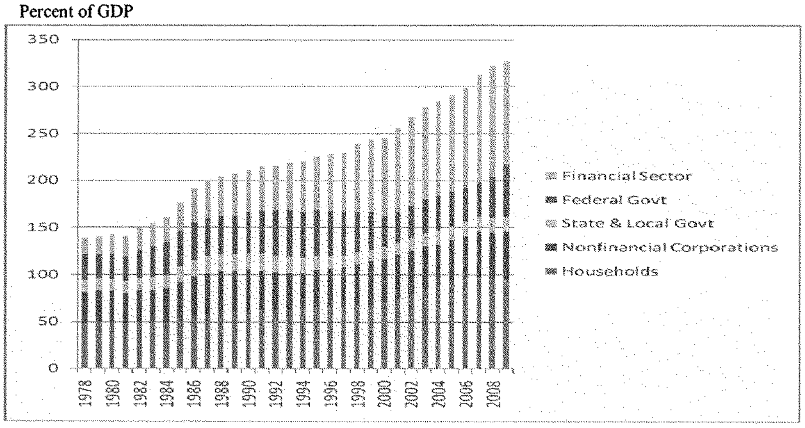
[9] Core capital elements include qualifying common stockholders' equity, qualifying noncumulative perpetual preferred stock, class A minority interest in preferred stock, and a set of restricted core capital elements including but not limited to trust preferred securities. See Appendix A of the FDIC regulations for the Bank Holding Company Act, section II(A)(1)(a)(i) – (iv). Available at http://www.fdic.gov/regulations/laws/rules/6000-1900.html.

[10] Showing debt as a percent of GDP relates the size each sector's debt to total economic activity. Since both the underlying debt (continued...)

What exactly is measured by these figures? The vast majority of household debt consists of mortgage debt (including home equity loans) and consumer credit (primarily credit card debt and auto loans). Financial sector debt is not so easily characterized, but essentially it represents the liability side of financial institutions' balance sheets. These liabilities support extensions of credit in all forms to households, businesses, and other financial institutions.

Figures based on total debt outstanding give the best sense of long-term trends, but they obscure significant short–term volatility. **Figure 2** shows year-to-year percentage changes in net borrowing by sector. These figures are based on absolute dollar amounts, not shares of GDP. A

Figure 1. Debt Outstanding by Sector , as a Percent of Gross Domestic Product: 1978—2009

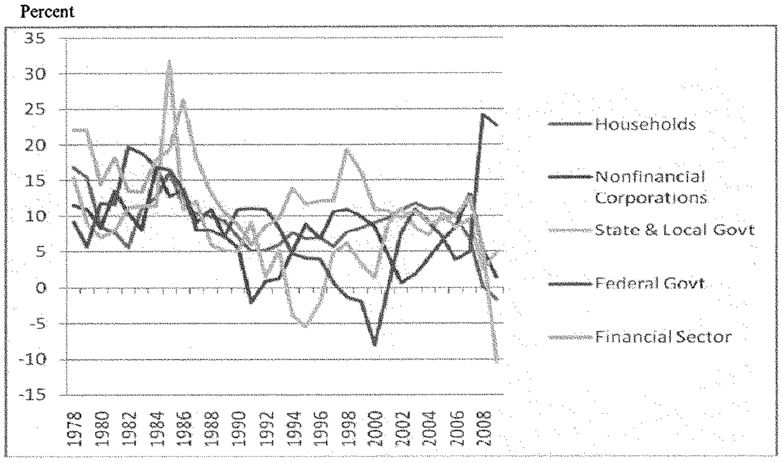


Source: Federal Reserve, Flow of Funds, Table D3; and Bureau of Economic Analysis, Dept. of Commerce.

(...continued)

and GDP figures are in current dollars, dividing debt by GDP provides a rough correction for inflation.

Figure 2: Debt Growth by Sector: 1978—2009

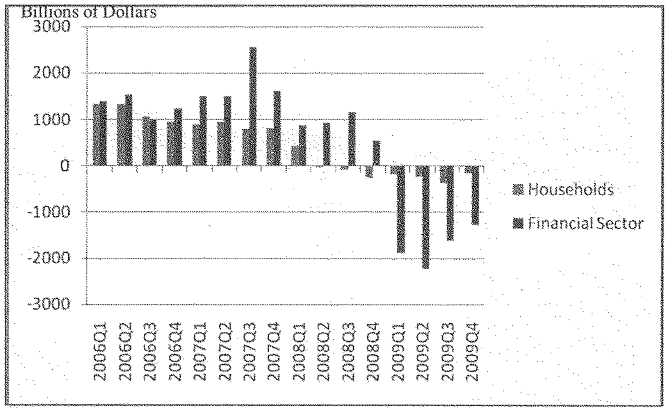


Source: Federal Reserve, Flow of Funds, Table D1.

striking feature of **Figure 2** is the experience of the past two years. Financial sector borrowing, which expanded by 12.6% in 2007, contracted by 10.3% in 2009. Rapid deleveraging in the financial sector is counterbalanced by a surge in federal borrowing of similar magnitude, as government pumped funds into the financial system and broader economy to avert a severe economic contraction. In graphic form, the two lines could be seen as the "jaws" of the Panic of 2008 and is consistent with the historical pattern identified by Reinhart and Rogoff referred to above. Net household debt also contracted in 2009, for the first time in the 32-year span covered by the chart.

Figure 3 below breaks out the quarterly changes (at annual rates) in net borrowing for the household and financial sectors during the crisis, now shown as dollar amounts. This reduction in private sector borrowing during a crisis is consistent with what economists call the paradox of thrift, in which the simultaneous reduction in spending by many households at once could result in a declining overall economy. If other sectors such as government spending or net exports do not expand to counterbalance the reductions in household and investment spending, then the attempt to save by reducing borrowing could paradoxically result in less total saving. Economists sometimes suggest that government can step in to fill the gap, in what is commonly referred to as Keynesian fiscal policy. Note that comparing **Figures 2** and **3** suggests that state and local governments were seeking to sharply reduce borrowing at the same time that households reduced borrowing, perhaps due to constraints on government spending contained in state constitutions. State and local governments were therefore contributing to the contraction in the rate of total borrowing in the first half of 2008 (the green line in **Figure 2**), although the rate of state and local government borrowing began increasing after the panic.

Figure 3. Net Borrowing by Household and Financial Sectors: 1978—2009



Source: Federal Reserve, Flow of Funds, Table D2.

Household Sector Leverage

U.S. households became more leveraged during the housing boom. In some ways, this is counterintuitive. Because close to 70% of U.S. households own their own homes, and most people move infrequently, house price appreciation should increase household wealth compared to debt. If mortgage debt had remained fixed, the ratio of household debt compared to the value of total assets would have declined. However, the housing boom coincided with a decline in interest rates during which many people refinanced their homes. **Figure 4** shows that mortgage equity withdrawal peaked during 2002-2006, exceeding 8% of disposable income in 2004. Mortgage refinancing allowed many people to withdraw home equity to finance other consumption purchases during the boom, but also increased total mortgage debt.

Changes in mortgage markets allowed for additional household leverage beyond cash-out refinancing. The increased use of adjustable-rate mortgages (ARMs) allowed people to take out more debt for the same income relative to what they might have qualified for with a fixed rate mortgage. For example, ARMs facilitated household leverage in those cases in which the underwriter qualified the borrower based on the temporarily low introductory rate of the ARM rather than the higher fixed rate (the "fully indexed" rate). The share of prime borrowers using ARMs rather than fixed rate mortgages was higher in California and other high appreciation areas than in places were house prices were more stable. Other mortgage contract terms also contributed to household leverage, such as piggy-back loans and loans with interest only periods.[11] When house prices fell, the default rate rose most significantly among borrowers who had taken on more leverage in high appreciating areas.

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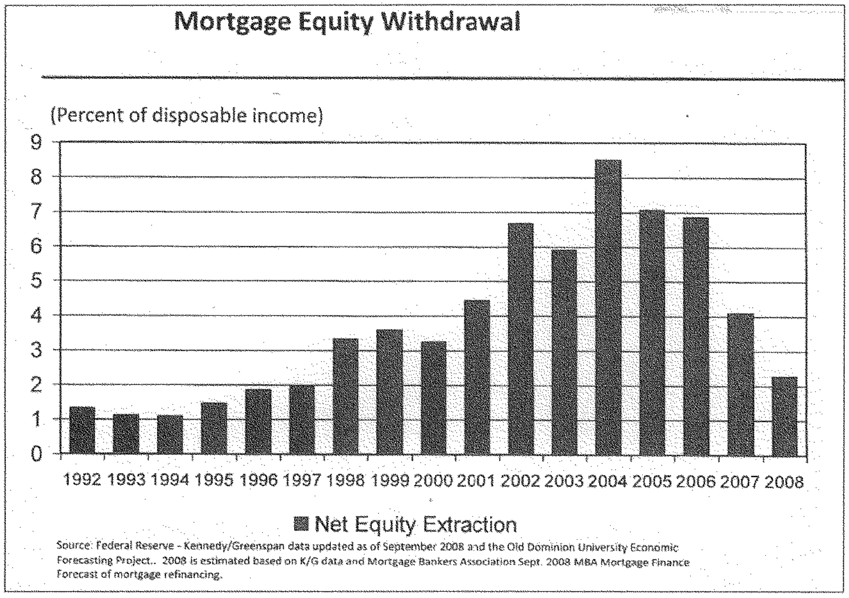
[11] A piggy back loan is a second loan used by a borrower to cover part of the traditional 20% down payment. Interest-only periods refer to mortgage payments that only covered current interest, leaving the entire loan balance unamortized for the period.

In addition to the increase in the total amount of household debt, many have argued that the expectation that mortgage debt would continue to be easy to service contributed to the crisis. Federal Reserve Chairman Ben Bernanke may have summarized the role of expectations best in his "Four Questions About the Financial Crisis", in which he said, "lenders may have become careless because they, like many people at the time, expected that house prices would continue to rise--thereby allowing borrowers to build up equity in their homes--and that credit would remain easily available, so that borrowers would be able to refinance if necessary." [12]

Figure 4. Households Use Mortgage Refinances to Tap Rising House Prices



Mortgage Equity Withdrawal

Source: Federal Reserve - Kennedy/Greenspan data updated as of September 2008 and the Old Dominion University Economic Forecasting Project.. 2008 is estimated based on K/G data and Mortgage Bankers Association Sept. 2008 MBA Mortgage Finance Forecast of mortgage refinancing.

Source: Federal Reserve: Kennedy/Greenspan data supplemented by Gilbert Yocham of the Virginia Mortgage Lenders Association, available at http://www.virginiamla.com/_docs/convention/08economy.pdf.

Government Leverage

One reason for concern for levels of government debt is that financial crises have also occurred due to sovereign debt defaults. The United States government became more leveraged at the same time as U.S. households. After a brief period of budget surpluses during the 1990s, U.S. federal deficits increased significantly in the 2000s. The United States was not alone. Government debt levels increased in many countries, including Greece, Ireland, Iceland, and other Western economies. Not only does high government leverage make economies more vulnerable to financial crisis, but Reinhart and Rogoff's study also found that financial crises have historically increased government debt dramatically.[13] In the United States and elsewhere, government interventions to stabilize the financial system and provide fiscal stimulus have been financed though dramatic increases in borrowing.

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[12] Ben Bernanke, "Four Questions About the Financial Crisis," speech at the Morehouse College, Atlanta, Georgia April 14, 2009, available at http://www.federalreserve.gov/newsevents/speech/bernanke20090414a.htm.

The international position of United States debt is still relatively stable. One reason is that the United States is considered low risk and tends to benefit from a general flight to safety. Another reason may be that the increase in United States government debt was offset by decreases in private debt. The net external debt position of the United States as a whole was relatively unchanged following the panic. **Table 2** presents selected data from the joint Bank for International Settlements – International Monetary Fund – World Bank country debt database. External United States general government debt increased from $3.1 trillion to $3.7 trillion from 4th quarter 2008 to 4th quarter 2009. However, external United States bank debt fell by $200 billion over the same period. The net effect of all sectors was that external United States debt increased only from $13.75 trillion to $13.77 trillion following the panic.

Table 2: Gross External Debt of the United States, 4Q2008 – 4Q 2009 (Selected Sectors)
In Billions of Dollars

	4Q 2008	4Q 2009
General Government	$3,100	3,700
Monetary Authority	316	372
Banks	3,038	2,834
Direct Investment	1,080	1,112
NonBank Private Sectors	6,216	5,749
Gross Total External Debt Position	13,750	13,768

Source: Joint External Debt Hub, BIS-IMF-World Bank, available at http://devdata.worldbank.org/sdmx/jedh/jedh_instrument.html
Note: Numbers do not add up because only selected sectors are presented.

It may be difficult to identify the counterfactual to federal government intervention. That is, even if neither the Bush administration nor the Obama administration had been willing and able to enact increases in the national debt in order to attempt to stabilize financial markets, government debt may have increased sharply during the crisis. One reason is that government revenues decline during recessions. It should be noted that attempts by Herbert Hoover to raise taxes in 1932 and by FDR to raise taxes in 1937 did not result in significantly lower federal government deficits because the economy declined and spending requirements did not.

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[13] Carmen M. Reinhart and Kenneth S. Rogoff, *This Time is Different: A Panoramic View of Eight Centuries of Financial Crises*, NBER Working Paper No. 13882, Mar. 2008.

Financial Sector Leverage

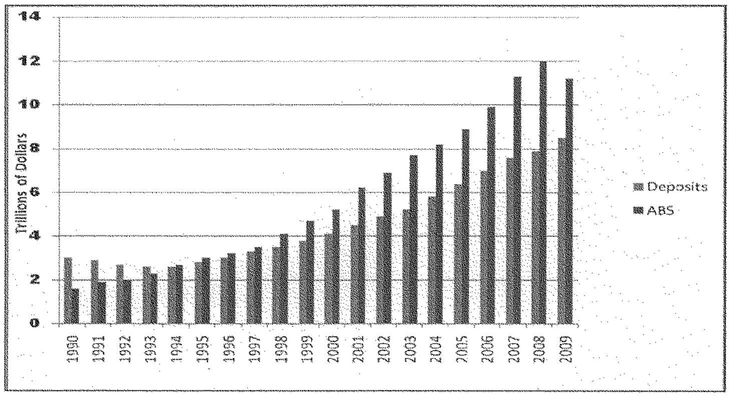
Leverage in the financial sector may have especially powerful effects on the economy. Households, firms, and governments depend in part on the financial sector for their own access to credit to finance investment and consumption, as well as to roll over existing debt. That is, other sectors depend on the financial sector to help manage their own leverage. If the financial system is temporarily disrupted, leveraged institutions elsewhere in the economy may be more at risk. Financial institutions also rely on each other to manage their own leverage. Therefore, a disruption to one financial firm may hurt other financial firms because they depend on each other for liquidity – which is in stark contrast to other firms in the same industry, such as Coca-Cola and Pepsi, which would tend to gain from the demise of the other. Losses among leveraged financial institutions may produce a downward spiral because when lenders suffer losses, one of the methods they use to restore their leverage ratio is to reduce lending, which makes it more difficult for other firms to roll over debt, raising defaults further, and reinforcing downward pressures. In summary, when financial institutions suffer unexpectedly high loan losses, their capital declines and their leverage increases, and attempts to restore their leverage ratio cuts credit availability and risks increasing defaults further.

The financial sector became more leveraged during the lead up to the financial crisis, for several reasons. More financial activity migrated out of depository banks, whose leverage is tightly regulated, to securities-based financial markets, often referred to as the shadow banking system. For example, rather than a depository bank originating a loan and holding it on its own balance sheet, backed by sufficient regulatory capital, securitization allowed both banks and nonbanks to originate loans and sell them to non-depository financial institutions, where leverage rules were less restrictive.

When the originating depository bank sponsored a securitization and offered some form of first loss position, liquidity backstop, or other guaranty, the risk-based capital required for the contingent liability was often less than what would have been required if the loans had not been securitized. In other words, securitization may have allowed depository banks to increase their leverage and hold less capital for any given level of lending activity. To the extent that firms and regulators underestimated the risk of default and loan losses to securitized assets, and depositories bought or held mortgage-backed securities, asset-backed securities, and other structured finance products, the migration of bank finance away from deposits allowed for greater leverage.

Figure 5 shows the growth of securitization markets relative to bank deposits over the period 1990—2009. Shown are the values of deposits in banks and savings associations and asset-backed securities (ABS) outstanding. New issues of ABS fell dramatically—to zero in some markets—during the crisis, except for securities offered by government agencies (Ginnie Mae), government-sponsored enterprises (Fannie Mae and Freddie Mac), and even there the Federal Reserve and the Treasury were (and remain) major purchasers.

Figure 5. Deposits and Asset-Backed Securities Outstanding: 1990—2009



Source: Federal Reserve, Flow of Funds.

Leverage in Individual Institutions

Concerns about the role of leverage in the crisis focus on the major financial institutions that collapsed or required massive infusions of liquidity or capital from the Treasury and the Federal Reserve. The Government Accountability office (GAO) analyzed leverage at five large commercial banks and five investment banks. **Figure 6** and **Figure 7** compare GAO's findings for leverage among broker-dealers to leverage among large banks, respectively.[14] **Figure 6** shows that broker-dealers were generally leveraged 25:1 to 30:1 while **Figure 7** shows that large banks were generally leveraged about 15:1. Note that 15:1 is a more cautious, or prudent, leverage ratio than 30:1. The broker dealers included Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch and Morgan Stanley. The large banks included Bank of America, Citigroup, JP Morgan Chase, Wachovia, and Wells Fargo.

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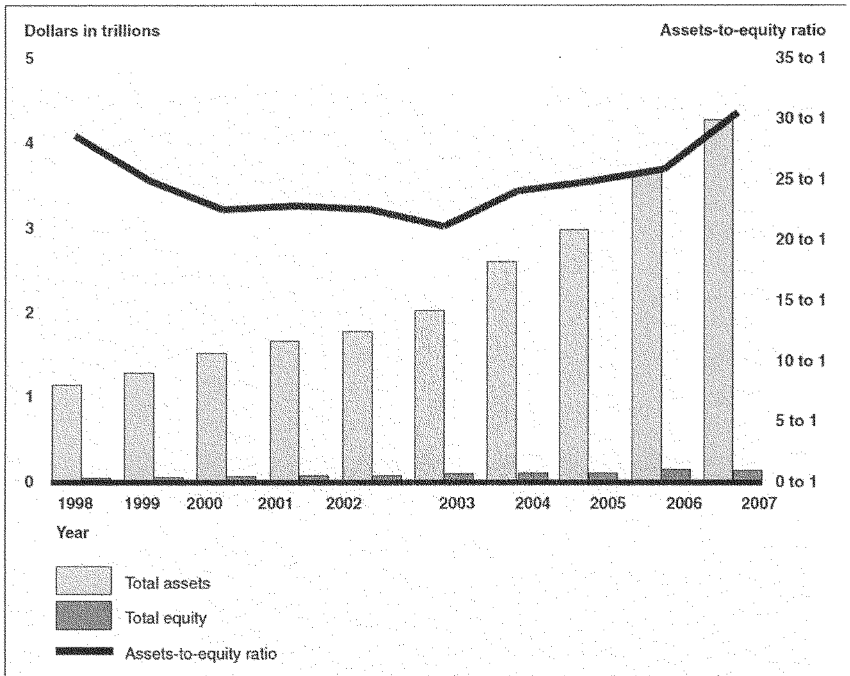
[14] U.S. Government Accountability Office, *Financial Markets Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System*, GAO-09-739, July 22, 2009, pp. 18 -19.

Figure 6. Total Assets, Equity, and Leverage (Assets-to-Equity) Ratio for Five Large U.S. Broker-Dealer Holding Companies, 1998-2007



Source: GAO analysis of annual report data for Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley.

Source: GAO

Figure 7. Total Assets, Equity, and Leverage (Assets-to-Equity Ratio) of Five Large U.S. Bank Holding Companies, 1998-2007

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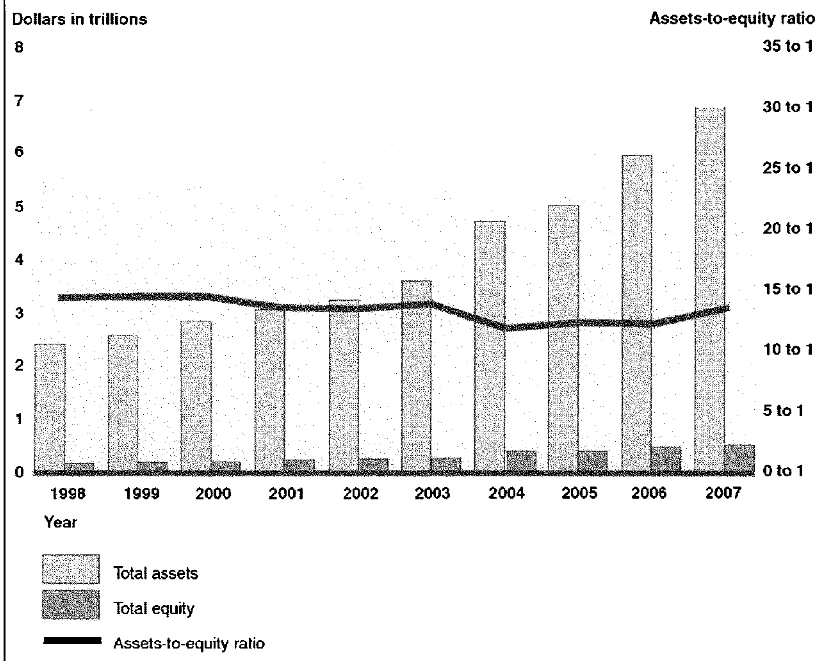

Source: GAO analysis of annual report and Federal Reserve Y-9C data for Bank of America, Citigroup, JPMorgan Chase, Wachovia, and Wells Fargo.

Source: GAO

The leverage ratios presented in **Figure 6** and **Figure 7** do not fully capture the riskiness of these ten financial institutions for at least two reasons. First, **Figure 6** and **Figure 7** do not take into account off-balance sheet activities, such as structured investment vehicles (SIVs) and other variable interest entities (VIEs), that exposed large banks to additional risk. Second, the report of the bankruptcy examiner in the Lehman Brothers case suggested that the firm used "repo 105" transactions to reduce the appearance of leverage in the firm's accounting statements.[15] Subsequently, other large firms admitted using similar transactions although they insisted that their use was fully disclosed.

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[15] In Re Lehman Brothers Holding, Inc., Report of Anton R. Valukas, Examiner, United States Bankruptcy Court, Southern District of New York, March 11, 2020, available at http://lehmanreport.jenner.com/.

The government sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, were also highly leveraged.[16] Their charters statutorily defined adequate capital at very high rates of leverage, compared to commercial banks and mortgage market lenders. For example, despite combined exposure to mortgage assets exceeding $7 trillion in 2008, the two enterprises had less than $100 billion in combined capital.[17] Yet, their regulator announced that the enterprises met the definition of being adequately capitalized as of March of 2008.[18] Their high leverage, which was closer to the level of a broker dealer than to a large mortgage bank, helps explain why the GSEs could be wiped out by rising mortgage defaults even though their average default rate was generally lower than other institutions that focused on the mortgage market.

Major Financial Reform Proposals in the 111th Congress

Two major financial reform proposals have either passed a chamber or been issued by a committee of jurisdiction (H.R. 4173 and S. 3217).[19] The "Wall Street Reform and Consumer Protection Act of 2009" (H.R. 4173) and the House passed the bill on December 11, 2009. The Senate Banking, Housing, and Urban Affairs Committee reported Chairman Christopher Dodd's reform bill, the "Restoring American Financial Stability Act of 2010" (S. 3217). Each of these proposals addresses leverage.

Both proposals would require that firms designated as posing systemic risk be subjected to stricter prudential standards. Among the restrictions, both bills would require the prudential regulator for these firms to address leverage. The House bill specifies a maximum leverage ratio regulation for systemic firms of 15:1, roughly half of the leverage ratio for large broker-dealers during the economic expansion. The Senate bill continues the current approach of allowing regulators to set the specific standard, although the standard must be more restrictive than current regulation of large firms.

The House proposal directs prudential regulators to establish countercyclical capital standards. Sometimes called the "Spanish Model," countercyclical capital standards allow regulators to reduce allowable leverage during booms and loosen leverage requirements during busts. One possible effect of countercyclical leverage would be to provide bank regulators with a tool to reduce the tendency of credit expansions that contribute to asset bubbles. The ability to loosen leverage restrictions during booms would allow regulators to attempt to mitigate the effects of credit contraction if an asset bubble were to burst.

The Obama administration has also proposed a tax that depends on leverage. Although directed at fulfilling statutory requirements that the Troubled Asset Relief (TARP) program be repaid with revenues from the financial services industry, the proposed bank fee would also have the effect of reducing the incentive of banks to fund themselves with relatively risky forms of leverage. The bank fee would apply to banks with more than $50 billion in assets. Banks that funded themselves entirely with deposits would escape the tax. Non-deposit sources of funds would be taxed. Therefore, the bank fee as proposed would encourage lenders to fund their leverage with what are believed to be relatively stable forms of debt, namely insured deposits.

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[16] See CRS Report RL 34661, *Fannie Mae's and Freddie Mac's Financial Problems*, N. Eric Weiss.

[17] The GSEs issued their own debt to finance mortgages retained in their portfolios. They also provided a guarantee of payment for defaulting mortgages contained in the MBS that they sold. The $7 trillion includes both the mortgages retained in their portfolio and subject to their MBS guarantee.

[18] OFHEO News Release, March 11, 2008, available at http://www.fhfa.gov/webfiles/2195/CAPCLASS31108.pdf.

[19] See CRS Report R40975, *Financial Regulatory Reform in the 111th Congress*, Baird Webel et al.

United States Government Accountability Office

GAO

Report to Congressional Committees

July 2009

FINANCIAL MARKETS REGULATION

Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System

On July 27, 2009, this report was revised to replace figure 6 on page 41 with the correct graphic.

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Highlights

Highlights of GAO-09-739, a report to congressional committees

July 2009

FINANCIAL MARKETS REGULATION

Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and across System

Why GAO Did This Study

The Emergency Economic Stabilization Act directed GAO to study the role of leverage in the current financial crisis and federal oversight of leverage. GAO's objectives were to review (1) how leveraging and deleveraging by financial institutions may have contributed to the crisis, (2) regulations adopted by federal financial regulators to limit leverage and how regulators oversee compliance with the regulations, and (3) any limitations the current crisis has revealed in regulatory approaches used to restrict leverage and regulatory proposals to address them. To meet these objectives, GAO built on its existing body of work, reviewed relevant laws and regulations and academic and other studies, and interviewed regulators and market participants.

What GAO Recommends

As Congress considers establishing a systemic risk regulator, it should consider the merits of assigning such a regulator with responsibility for overseeing systemwide leverage. As U.S. regulators continue to consider reforms to strengthen oversight of leverage, we recommend that they assess the extent to which reforms under Basel II, a new risk-based capital framework, will address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches used for capital adequacy purposes. In their written comments, the regulators generally agreed with our conclusions and recommendation.

View GAO-09-739 or key components.
For more information, contact Orice Williams Brown at (202) 512-8678 or williamso@gao.gov.

What GAO Found

Some studies suggested that leverage steadily increased in the financial sector before the crisis, and deleveraging by financial institutions may have contributed to the crisis. First, the studies suggested that deleveraging by selling financial assets could cause prices to spiral downward during times of market stress. Second, the studies suggested that deleveraging by restricting new lending could slow economic growth. However, other theories also provide possible explanations for the sharp price declines observed in certain assets. As the crisis is complex, no single theory is likely to fully explain what occurred or rule out other explanations. Regulators and market participants we interviewed had mixed views about the effects of deleveraging. Some officials told us that they generally have not seen asset sales leading to downward price spirals, but others said that asset sales have led to such spirals.

Federal regulators impose capital and other requirements on their regulated institutions to limit leverage and ensure financial stability. Federal bank regulators impose minimum risk-based capital and leverage ratios on banks and thrifts and supervise the capital adequacy of such firms through on-site examinations and off-site monitoring. Bank holding companies are subject to similar capital requirements as banks, but thrift holding companies are not. The Securities and Exchange Commission uses its net capital rule to limit broker-dealer leverage and used to require certain broker-dealer holding companies to report risk-based capital ratios and meet certain liquidity requirements. Other important market participants, such as hedge funds, use leverage. Hedge funds typically are not subject to regulatory capital requirements, but market discipline, supplemented by regulatory oversight of institutions that transact with them, can serve to constrain their leverage.

The crisis has revealed limitations in regulatory approaches used to restrict leverage. First, regulatory capital measures did not always fully capture certain risks. For example, many financial institutions applied risk models in ways that significantly underestimated certain risk exposures. As a result, these institutions did not hold capital commensurate with their risks and some faced capital shortfalls when the crisis began. Federal regulators have called for reforms, including through international efforts to revise the Basel II capital framework. The planned U.S. implementation of Basel II would increase reliance on risk models for determining capital needs for certain large institutions. Although the crisis underscored concerns about the use of such models for determining capital adequacy, regulators have not assessed whether proposed Basel II reforms will address these concerns. However, such an assessment is critical to ensure that changes to the regulatory framework address the limitations revealed by the crisis. Second, regulators face challenges in counteracting cyclical leverage trends and are working on reform proposals. Finally, the crisis has reinforced the need to focus greater attention on systemic risk. With multiple regulators responsible for individual markets or institutions, none has clear responsibility to assess the potential effects of the buildup of systemwide leverage or the collective activities of institutions to deleverage.

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Abbreviations

CAMELS	capital, asset quality, management, earnings, liquidity, sensitivity to market risk
CDO	collateralized debt obligations
CORE	capital, organizational structure, risk management, and earnings
CSE	Consolidated Supervised Entity
CFTC	Commodity Futures Trading Commission
FDIC	Federal Deposit Insurance Corporation
FINRA	Financial Industry Regulatory Authority
FSOC	Financial Services Oversight Council
GAAP	Generally Accepted Accounting Principles
GDP	gross domestic product
IG	inspector general
MRA	Market Risk Amendment
NYSE	New York Stock Exchange
OCC	Office of the Comptroller of the Currency
OTC	over the counter
OTS	Office of Thrift Supervision
PCA	Prompt Corrective Action
SEC	Securities and Exchange Commission
SPE	special purpose entity
SRC	systemic risk council
SRO	self-regulatory organization
VaR	value-at-risk

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GAO
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Congressional Committees

The United States is in the midst of the worst financial crisis in more than 75 years. To date, federal regulators and authorities have taken unprecedented steps to stem the unraveling of the financial services sector by committing trillions of dollars of taxpayer funds to rescue financial institutions and restore order to credit markets. Although the current crisis has spread across a broad range of financial instruments, it was initially triggered by defaults on U.S. subprime mortgage loans, many of which had been packaged and sold as securities to buyers in the United States and around the world. With financial institutions from many countries participating in these activities, the resulting turmoil has afflicted financial markets globally and has spurred coordinated action by world leaders in an attempt to protect savings and restore the health of the markets.

The buildup of leverage during a market expansion and the rush to reduce leverage, or "deleverage," when market conditions deteriorated was common to this and other financial crises. Leverage traditionally has referred to the use of debt, instead of equity, to fund an asset and been measured by the ratio of total assets to equity on the balance sheet. But as witnessed in the current crisis, leverage also can be used to increase an exposure to a financial asset without using debt, such as by using derivatives.[1] In that regard, leverage can be defined broadly as the ratio between some measure of risk exposure and capital that can be used to absorb unexpected losses from the exposure.[2] However, because leverage can be achieved through many different strategies, no single measure can capture all aspects of leverage. Federal financial regulators are responsible for establishing regulations that restrict the use of leverage by financial institutions under their authority and supervising their institutions' compliance with such regulations.

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[1] Derivatives are financial products whose value is determined from an underlying reference rate (interest rates, foreign currency exchange rates); an index (that reflects the collective value of various financial products); or an asset (stocks, bonds, and commodities). Derivatives can be traded through central locations, called exchanges, where buyers and sellers, or their representatives, meet to determine prices; or privately negotiated by the parties off the exchanges or over the counter (OTC).

[2] Capital generally is defined as a firm's long-term source of funding, contributed largely by a firm's equity stockholders and its own returns in the form of retained earnings. One important function of capital is to absorb losses.

On October 3, 2008, the Emergency Economic Stabilization Act of 2008 (the act) was signed into law.[3] The act's purpose is to provide the Secretary of the Department of the Treasury (Treasury) with the authority to restore liquidity and stability to the U.S. financial system and to ensure the economic well-being of Americans. To that end, the act established the Office of Financial Stability within Treasury and authorized the Troubled Asset Relief Program. The act provided Treasury with broad, flexible authorities to buy or guarantee up to $700 billion in "troubled assets," which include mortgages and mortgage-related instruments, and any other financial instrument the purchase of which Treasury determines is needed to stabilize the financial markets.[4]

The act also established several reporting requirements for GAO. One of these requires the U.S. Comptroller General to "undertake a study to determine the extent to which leverage and sudden deleveraging of financial institutions was a factor behind the current financial crisis."[5] Additionally, the study is to include an analysis of the roles and responsibilities of federal financial regulators for monitoring leverage and the authority of the Board of Governors of the Federal Reserve System (Federal Reserve) to regulate leverage.[6] To address this mandate, we sought to answer the following questions:

1. How have leveraging and deleveraging by financial institutions contributed to the current financial crisis, according to primarily academic and other studies?
2. What regulations have federal financial regulators adopted to try to limit the use of leverage by financial institutions, and how do the regulators oversee the institutions' compliance with the regulations?

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[3] Pub. L. No. 110-343, div. A, 122 Stat. 3765 (2008), codified at 12 U.S.C. §§ 5201 et seq.

[4] Section 102 of the act, 12 U.S.C. § 5212, authorizes Treasury to guarantee troubled assets originated or issued prior to March 14, 2008, including mortgage-backed securities.

[5] Section 117 of the act, 12 U.S.C. § 5227.

[6] In a May 26, 2009, letter, the Federal Reserve outlined its authority to monitor and regulate leverage and to set margin requirements (see app. IX).

3. What, if any, limitations has the current financial crisis revealed about the regulatory framework used to restrict leverage, and what changes have regulators and others proposed to address these limitations?

To satisfy our responsibility under the act's mandate to report the results of this work by June 1, 2009, we provided an interim report on the results of this work in the form of a briefing to the committees' staffs on May 27, 2009. Appendix II contains the full briefing. This letter represents the final report.

To address our objectives, we reviewed and analyzed academic and other studies assessing the buildup of leverage prior to the current financial crisis and the economic mechanisms that possibly helped the mortgage-related losses spread to other markets and expand into the current crisis. We reviewed and analyzed relevant laws and regulations, and other regulatory guidance and materials, related to the oversight of financial institutions' use of leverage by the Federal Reserve, Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), Office of Thrift Supervision (OTS), and Securities and Exchange Commission (SEC). We also collected and analyzed various data to illustrate leverage and other relevant trends. We assessed the reliability of the data and found that they were sufficiently reliable for our purposes. In addition, we interviewed staff from these federal financial regulators and officials from two securities firms, a bank, and a credit rating agency. We also reviewed and analyzed studies done by U.S. and international regulators and others identifying limitations in the regulatory framework used to restrict leverage and proposals to address such limitations. Finally, we reviewed prior GAO work on the financial regulatory system.

The work upon which this report is based was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. This work was conducted between February and July 2009. A more extensive discussion of our scope and methodology appears in appendix I.

Results in Brief

According to studies we reviewed, leverage steadily increased within the financial sector before the crisis began around mid-2007, and banks, securities firms, hedge funds, and other financial institutions have sought to deleverage and reduce their risk since the onset of the crisis. Some studies suggested that the efforts taken by financial institutions to deleverage by selling financial assets and restricting new lending could have contributed to the current crisis. First, some studies we reviewed suggested that deleveraging through asset sales could trigger downward spirals in financial asset prices. In times of market crisis, a sharp drop in an asset's price can lead investors to sell the asset, which could push the asset's price even lower. For leveraged institutions holding the asset, the impact of their losses on capital will be magnified. The subsequent price decline could induce additional sales that cause the asset's price to fall further. In the extreme, this downward asset spiral could cause the asset's price to be set below its fundamental value, or at a "fire sale" price. In addition, a decline in a financial asset's price could trigger sales, when the asset is used as collateral for a loan. In such a case, the borrower could be required to post additional collateral for its loan, but if the borrower could not do so, the lender could take ownership of the collateral and then sell it, which could cause the asset's price to decline further. However, other theories, such as that the current market prices are the result of asset prices reverting to their fundamental values after a period of overvaluation, provide possible explanations for the sharp price declines in mortgage-related securities and other financial instruments. As the crisis is complex, no single theory likely is to explain in full what occurred. Second, some studies we reviewed suggested that deleveraging by restricting new lending could contribute to the crisis by slowing economic growth. In short, the concern is that banks, because of their leverage, will need to cut back their lending by a multiple of their credit losses. Moreover, rapidly declining asset prices can inhibit the ability of borrowers to raise money in the securities markets. Financial regulators and market participants we interviewed had mixed views about the effects of deleveraging by financial institutions in the current crisis. Some regulatory officials and market participants told us that they generally have not seen asset sales leading to downward price spirals, but others said that asset sales involving a variety of debt instruments have contributed to such spirals. Regulatory and credit rating agency officials told us that banks have tightened their lending standards for some loans, such as ones with less favorable risk-adjusted returns. They also said that some banks rely on the securities markets to help them fund loans and, thus, need conditions in the securities markets to improve. As we have discussed in our prior work, since the crisis began, federal regulators and authorities have undertaken a number of steps to facilitate financial intermediation by banks and the securities markets.[7]

Federal financial regulators generally impose capital and other requirements on their regulated institutions as a way to limit the use of leverage and ensure the stability of the financial system and markets. Specifically, federal banking and thrift regulators have imposed minimum risk-based capital and leverage ratios on their regulated institutions. The risk-based capital ratios generally are designed to require banks and thrifts to hold more capital for more risky assets. Although regulators have imposed minimum leverage ratios on regulated institutions, some regulators told us that they primarily focus on the risk-based capital ratios to limit the use of leverage. In addition, they supervise the capital adequacy of their regulated institutions through on-site examinations and off-site monitoring. Bank holding companies are subject to capital and leverage ratio requirements similar to those imposed on banks, but thrift holding companies are not subject to such requirements. Instead, capital levels of thrift holding companies are individually evaluated based on each company's risk profile. SEC primarily uses its net capital rule to limit the use of leverage by broker-dealers. The rule serves to protect market participants from broker-dealer failures and to enable broker-dealers that fail to meet the rule's minimum requirements to be liquidated in an orderly fashion. For the holding companies of broker-dealers that participated in SEC's discontinued Consolidated Supervised Entity (CSE) program, they calculated their risk-based capital ratios in a manner designed to be consistent with the method used by banks.[8] In addition to the capital ratio, SEC imposed a liquidity requirement on CSE holding companies. Other financial institutions, such as hedge funds, have become important participants in the financial markets, and many use leverage. But, unlike banks and broker-dealers, hedge funds typically are not subject to regulatory capital requirements that limit their use of leverage. Rather, their use of leverage is to be constrained primarily through market discipline, supplemented by regulatory oversight of banks and broker-dealers that transact with hedge funds as creditors and counterparties. Finally, the Federal Reserve regulates the use of securities as collateral to finance security purchases, but federal financial regulators told us that such credit did not play a significant role in the buildup of leverage in the current crisis.

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[7] For example, see, GAO, *Troubled Asset Relief Program: March 2009 Status of Efforts to Address Transparency and Accountability Issues*, GAO-09-504 (Washington, D.C.: Mar. 31, 2009).

[8] Under its CSE program, SEC supervised five broker-dealer holding companies—Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, and Morgan Stanley—on a consolidated basis. Following the sale of Bear Stearns to JPMorgan Chase, the Lehman Brothers bankruptcy filing, and the sale of Merrill Lynch to Bank of America, the remaining CSEs opted to become bank holding companies subject to Federal Reserve oversight. SEC terminated the CSE program in September 2008 but continues to oversee these firms' registered broker-dealer subsidiaries.

The financial crisis has revealed limitations in existing regulatory approaches that serve to restrict leverage. Federal financial regulators have proposed reforms, but have not yet fully evaluated the extent to which these proposals would address these limitations. First, although large banks and broker-dealers generally held capital above the minimum regulatory capital requirements prior to the crisis, regulatory capital measures did not always fully capture certain risks, particularly those associated with some mortgage-related securities held on and off their balance sheets. As a result, a number of these institutions did not hold capital commensurate with their risks and some lacked adequate capital or liquidity to withstand the market stresses of the crisis. Federal financial regulators have acknowledged the need to improve the risk coverage of the regulatory capital framework and are considering reforms to better align capital requirements with risk. Furthermore, the crisis highlighted past concerns about the approach to be taken under Basel II, a new risk-based capital framework based on an international accord, such as the ability of banks' models to adequately measure risks for regulatory capital purposes and the regulators' ability to oversee them. Federal financial regulators have not formally assessed the extent to which Basel II reforms proposed by U.S. and international regulators may address these concerns. Such an assessment is critical to ensure that Basel II reforms, particularly those that would increase reliance on complex risk models for determining capital needs, do not exacerbate regulatory limitations revealed by the crisis. Second, the crisis illustrated how the existing regulatory framework, along with other factors, might have contributed to cyclical leverage trends that potentially exacerbated the current crisis. For example, minimum regulatory capital requirements may not provide adequate incentives for banks to build loss-absorbing capital buffers in benign markets when it is relatively less expensive to do so. When market conditions deteriorated, minimum capital requirements became binding for many institutions that lacked adequate buffers to absorb losses and faced sudden pressures to deleverage. As discussed, actions taken by individual institutions to deleverage by selling assets in stressed markets may exacerbate a financial crisis. Regulators are considering several options to counteract potentially harmful cyclical leverage trends, but implementation of these proposals presents challenges. Finally, the financial crisis has illustrated the potential for financial market disruptions, not just firm failures, to be a source of systemic risk. As some studies we reviewed suggested, ensuring the solvency of individual institutions may not be sufficient to protect the stability of the financial system, in part because of the potential for deleveraging by institutions to have negative spillover effects. In our prior work, we have noted that a regulatory system should focus on risk to the financial system, not just institutions.[9] With multiple regulators primarily responsible for individual markets or institutions, none of the financial regulators has clear responsibility to assess the potential effects of the buildup of leverage and deleveraging by a few institutions or by the collective activities of the industry for the financial system. As a result, regulators may be limited in their ability to prevent or mitigate future financial crises.

To ensure that there is a systemwide approach to addressing leverage-related issues across the financial system, we are providing a matter for congressional consideration. In particular, as Congress moves toward the creation of a systemic risk regulator, it should consider the merits of tasking this entity with the responsibility for measuring and monitoring systemwide leverage and evaluating options to limit procyclical leverage trends. Furthermore, to address concerns about the Basel II approach highlighted by the current financial crisis, we are making one recommendation to the heads of the Federal Reserve, FDIC, OCC, and OTS. Specifically, these regulators should assess the extent to which Basel II reforms may address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches used for capital adequacy purposes.

We provided the heads of the Federal Reserve, FDIC, OCC, OTS, SEC, and Treasury with a draft of this report for their review and comment. We received written comments from the Federal Reserve, FDIC, OCC, and SEC, which are reprinted in appendices V through VIII, respectively. The regulators generally agreed with our conclusions and recommendation. We did not receive written comments from OTS and Treasury. Except for Treasury, the agencies also provided technical comments that we incorporated in the report where appropriate.

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[9] See GAO, *Financial Regulation: A Framework for Crafting and Assessing Proposals to Modernize the Outdated U.S. Financial Regulatory System*, GAO-09-216 (Washington, D.C.: Jan. 8, 2009).

Background

The financial services industry comprises a broad range of financial institutions—including broker-dealers, banks, government-sponsored enterprises, hedge funds, insurance companies, and thrifts. Moreover, many of these financial institutions are part of a holding company structure, such as a bank or financial holding company.[10] In the United States, large parts of the financial services industry are regulated under a complex system of multiple federal and state regulators, and self-regulatory organizations (SRO) that operate largely along functional lines (see fig. 1).[11] Such oversight serves, in part, to help ensure that the financial institutions do not take on excessive risk that could undermine their safety and soundness. Primary bank supervisors—the Federal Reserve, FDIC, OCC, and OTS—oversee banks and thrifts according to their charters. Functional supervisors—primarily SEC, the Commodity Futures Trading Commission (CFTC), SROs, and state insurance regulators—oversee entities engaged in the securities and insurance industries as appropriate. Consolidated supervisors oversee holding companies that contain subsidiaries that have primary bank or functional supervisors—the Federal Reserve oversees bank holding companies and OTS oversees thrift holding companies.[12] In the last few decades, nonbank lenders, hedge funds, and other firms have become important participants in the financial services industry but are unregulated or less regulated.

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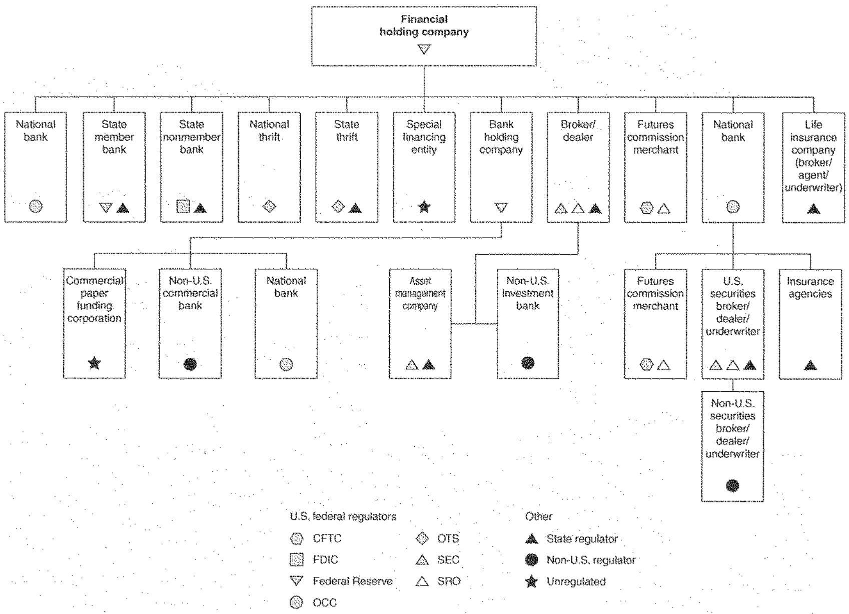
[10] For more detailed information about bank and financial holding companies, see GAO, *Financial Market Regulation: Agencies Engaged in Consolidated Supervision Can Strengthen Performance Measurement and Collaboration*, GAO-07-154 (Washington, D.C.: Mar. 15, 2007).

[11] For a more detailed discussion of the regulatory structure, see GAO-07-154 and GAO-09-216.

[12] As discussed below, SEC used to oversee certain broker-dealer holding companies on a consolidated basis.

Figure 1: Supervisors for a Hypothetical Financial Holding Company



Source: GAO.

To varying degrees, all financial institutions are exposed to a variety of risks that create the potential for financial loss associated with

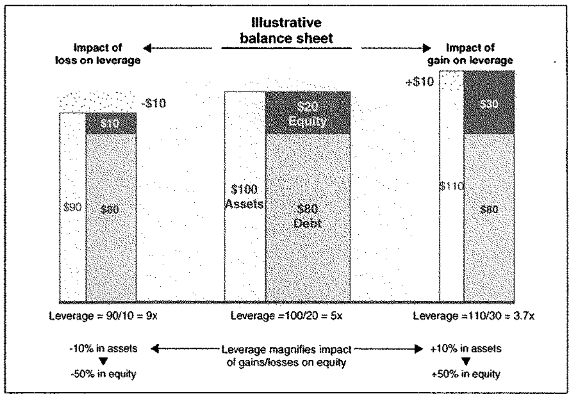
- failure of a borrower or counterparty to perform on an obligation—credit risk;
- broad movements in financial prices—interest rates or stock prices—market risk;

- failure to meet obligations because of inability to liquidate assets or obtain funding—liquidity risk;
- inadequate information systems, operational problems, and breaches in internal controls—operational risk;
- negative publicity regarding an institution's business practices and subsequent decline in customers, costly litigation, or revenue reductions—reputation risk;
- breaches of law or regulation that may result in heavy penalties or other costs—legal risk;
- risks that an insurance underwriter takes in exchange for premiums—insurance risk; and
- events not covered above, such as credit rating downgrades or factors beyond the control of the firm, such as major shocks in the firm's markets—business/event risk.

In addition, the industry as a whole is exposed to systemic risk, the risk that a disruption could cause widespread difficulties in the financial system as a whole.

Many financial institutions use leverage to expand their ability to invest or trade in financial assets and to increase their return on equity. A firm can use leverage through a number of strategies, including by using debt to finance an asset or entering into derivatives. Greater financial leverage, as measured by lower proportions of capital relative to assets, can increase the firm's market risk, because leverage magnifies gains and losses relative to equity. Leverage also can increase a firm's liquidity risk, because a leveraged firm may be forced to sell assets under adverse market conditions to reduce its exposure. As illustrated in figure 2, a 10 percent decline in the value of assets of an institution with an assets-to-equity ratio of 5-to-1 would deplete the institution's equity by 50 percent. Although commonly used as a leverage measure, the ratio of assets to equity captures only on-balance sheet assets and treats all assets as equally risky. Moreover, the ratio of assets to equity helps to measure the extent to which a change in total assets would affect equity but provides no information on the probability of such a change occurring. Finally, a leveraged position may not be more risky than a non-leveraged position, when other aspects of the position are not equal. For example, a non-leveraged position in a highly risky asset could be more risky than a leveraged position in a low risk asset.

Figure 2: Effect of a Gain or Loss on a Leveraged Institution's Balance Sheet



Source: GAO.

During the 1980s, banking regulators became concerned that simple leverage measures—such as the ratio of assets to equity or debt to equity—required too much capital for less-risky assets and not enough for riskier assets. Another concern was that such measures did not require capital for growing portfolios of off-balance sheet items. In response to these concerns, the Basel Committee on Banking Supervision adopted Basel I, an international framework for risk-based capital that required banks to meet minimum risk-based capital ratios, in 1988.[13] By 1992, U.S.

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[13] The Basel Committee on Banking Supervision (Basel Committee) seeks to improve the quality of banking supervision worldwide, in part by developing broad supervisory standards. The Basel Committee consists of central bank and regulatory officials from Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. The Basel Committee's supervisory standards are also often adopted by nonmember countries.

regulators had fully implemented Basel I; and in 1996, they and supervisors from other Basel Committee member countries amended the framework to include explicit capital requirements for market risk from trading activity (called the Market Risk Amendment).[14] In response to the views of bankers and many regulators that innovation in financial markets and advances in risk management have revealed limitations in the existing Basel I risk-based capital framework, especially for large, complex banks, the Basel Committee released the Basel II international accord in 2004. (App. III discusses limitations of Basel I, and app. IV describes the three pillars of Basel II.) Since then, individual countries have been implementing national rules based on the principles and detailed framework. In a prior report, we discussed the status of efforts by U.S. regulators to implement the Basel II accord.[15]

The dramatic decline in the U.S. housing market precipitated a decline in the price of financial assets around mid-2007 that were associated with housing, in particular mortgage assets based on subprime loans that lost value as the housing boom ended and the market underwent a dramatic correction. Some institutions found themselves so exposed that they were threatened with failure—and some failed—because they were unable to raise the necessary capital as the value of their portfolios declined. Other institutions, ranging from government-sponsored enterprises such as Fannie Mae and Freddie Mac to large securities firms, were left holding "toxic" mortgages or mortgage-related assets that became increasingly difficult to value, were illiquid, and potentially had little worth. Moreover, investors not only stopped buying securities backed by mortgages but also became reluctant to buy securities backed by many types of assets. Because of uncertainty about the financial condition and solvency of financial entities, the prices banks charged each other for funds rose dramatically, and interbank lending effectively came to a halt. The resulting liquidity and credit crunch made the financing on which businesses and individuals depend increasingly difficult to obtain as cash-strapped banks held on to their assets. By late summer of 2008, the potential ramifications of the financial crisis ranged from the continued failure of financial institutions to increased losses of individual savings and corporate investments and further tightening of credit that would exacerbate the emerging global economic slowdown that was beginning to take shape.

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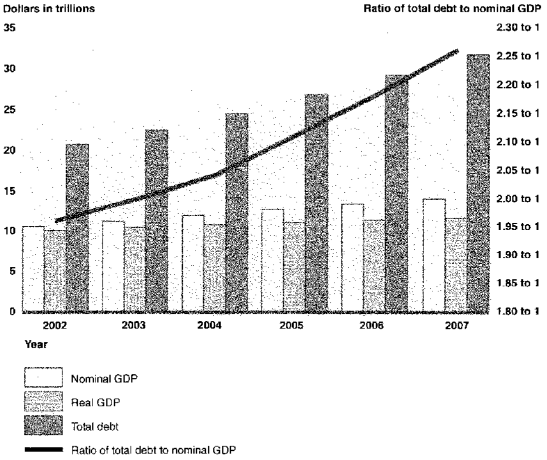
[14] According to OTS staff, OTS did not adopt the capital requirements for trading book market risk.

[15] GAO, *Risk-Based Capital: New Basel II Rules Reduced Certain Competitive Concerns, but Bank Regulators Should Address Remaining Uncertainties*, GAO-08-953 (Washington, D.C.: Sept. 12, 2008).

Research Suggests Leverage Increased before the Crisis and Subsequent Deleveraging Could Have Contributed to the Crisis

The current financial crisis is complex and multifaceted; and likewise, so are its causes, which remain subject to debate and ongoing research. Before the current crisis, leverage broadly increased across the economy. For example, as shown in figure 3, total debt in the United States increased from $20.7 trillion to $31.7 trillion, or by nearly 53 percent, from year-end 2002 to year-end 2007, and the ratio of total debt to gross domestic product (GDP) increased from 1.96 to 1 to 2.26 to 1, or by 15 percent, during the same period. In general, the more leveraged an economy, the more prone it is to crisis generated by moderate economic shocks.

Figure 3: Nominal GDP, Real GDP, Total Debt, and Ratio of Total Debt to Nominal GDP, 2002 to 2007



Source: GAO analysis of the Federal Reserve's Flow of Funds data and the Bureau of Economic Analysis's GDP data.

According to many researchers, the crisis initially was triggered by defaults on U.S. subprime mortgages around mid-2007. Academics and others have identified a number of factors that possibly helped fuel the housing boom, which helped set the stage for the subsequent problems in the subprime mortgage market. These factors include

- imprudent mortgage lending that permitted people to buy houses they could not afford;
- securitization of mortgages that reduced originators' incentives to be prudent;
- imprudent business and risk management decisions based on the expectation of continued housing price appreciation;
- faulty assumptions in the models used by credit rating agencies to rate mortgage-related securities;
- establishment of off-balance sheet entities by banks to hold mortgages or mortgage-related securities that allowed banks to make more loans during the expansion; and
- economic conditions, characterized by permissive monetary policies, ample liquidity and availability of credit, and low interest rates that spurred housing investment.[16]

Around mid-2007, the losses in the subprime mortgage market triggered a reassessment of financial risk in other debt instruments and sparked the current financial crisis. Academics and others have identified a number of economic mechanisms that possibly helped to cause the relatively small subprime mortgage-related losses to become a financial crisis. However, given our mandate, our review of the economic literature focused narrowly on deleveraging by financial institutions as one of the potential mechanisms.[17] (See the bibliography for the studies included in our literature review.) The studies we reviewed do not provide definitive findings about the role of deleveraging relative to other mechanisms, and we relied on our interpretation and reasoning to develop insights from the studies reviewed. Other theories that do not involve deleveraging may provide possible explanations for the sharp price declines in mortgage-related securities and other financial instruments. Because such theories are largely beyond the scope of our work, we discuss them only in brief.

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[16] See, for example, Mark Jickling, Causes of the Financial Crisis, Congressional Research Service, R40173 (Washington, D.C.: Jan. 29, 2009).

[17] Our review of the literature included primarily academic studies analyzing the events surrounding the current financial crisis. Because the crisis began around mid-2007, we limited the scope of our literature search to studies issued after June 2007. These studies include published papers and working papers.

Leverage within the Financial Sector Increased before the Financial Crisis, and Financial Institutions Have Sought to Deleverage Since the Crisis Began

Leverage steadily increased in the financial sector during the prolonged rise in housing and other asset prices and created vulnerabilities that have increased the severity of the crisis, according to studies we reviewed.[18] Leverage can take many different forms, and no single measure of leverage exists; in that regard, the studies generally identified a range of sources that aided in the buildup of leverage before the crisis. One such source was the use of short-term debt, such as repurchase agreements, by financial institutions to help fund their assets.[19] The reliance on short-term funding made the institutions vulnerable to a decline in the availability of such credit.[20] Another source of leverage was special purpose entities (SPE), which some banks created to buy and hold mortgage-related and other assets that the banks did not want to hold on their balance sheets.[21]

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[18] See, for example, Financial Services Authority, *The Turner Review: A Regulatory Response to the Global Banking Crisis* (London: March 2009); Willem H. Buiter, "Lessons from the North Atlantic Financial Crisis," paper prepared for presentation at the conference "The Role of Money Markets," jointly organized by Columbia Business School and the Federal Reserve Bank of New York on May 29-30, 2008 (May 2008); Martin Neil Baily, Robert E. Litan, and Matthew S. Johnson, "The Origins of the Financial Crisis," *Fixing Finance Series*-Paper 3, (Washington, D.C.: The Brookings Institution, November 2008); and Ben Cohen and Eli Remolona, "The Unfolding Turmoil of 2007–2008: Lessons and Responses," Proceedings of a Conference, Sydney, Australia, Reserve Bank of Australia, Sydney.

[19] Under a repurchase agreement, a borrower generally acquires funds by selling securities to a lender and agreeing to repurchase the securities after a specified time at a given price. Such a transaction is called a repurchase agreement when viewed from the perspective of the borrower, and a reverse repurchase agreement from the point of view of the lender.

[20] For example, a market observer commented that Lehman Brothers' failure stemmed partly from the firm's high level of leverage and use of short-term debt. According to the market observer, Lehman Brothers used short-term debt to finance more than 50 percent of its assets at the beginning of the crisis, which is a profitable strategy in a low interest rate environment but increases the risk of "runs" similar to the ones a bank faces when it is rumored to be insolvent. Any doubt about the solvency of the borrower makes short-term lenders reluctant about renewing their lending.

[21] See, for example, Acharya, V. and P. Schnabl, How Banks Played the Leverage "Game"? in Acharya, V., Richardson, M. (Eds.) *Restoring Financial Stability: How to Repair a Failed System*, John Wiley and Sons (chap. 2) (2009).

To obtain the funds to purchase their assets, SPEs often borrowed by issuing shorter-term instruments, such as commercial paper and medium-term notes, but this strategy exposed the SPEs to the risk of not being able to renew their debt. Similarly, to expand their funding sources or provide additional capacity on their balance sheets, financial institutions securitized mortgage-backed securities, among other assets, to form collateralized debt obligations (CDO). In a basic CDO, a group of debt securities are pooled, and securities are then issued in different tranches (or slices) that vary in risk and return. Through pooling and slicing, CDOs can give investors an embedded leveraged exposure.[22] Finally, the growth in credit default swaps, a type of OTC derivative, was another source of leverage. Credit default swaps aided the securitization process by providing credit enhancements to CDO issuers and provided financial institutions with another way to leverage their exposure to the mortgage market.

For securities firms, hedge funds, and other financial intermediaries that operate mainly through the capital markets, their balance sheet leverage, or ratio of total assets to equity, tends to be procyclical.[23] Historically, such institutions tended to increase their leverage when asset prices rose and decrease their leverage when asset prices fell.[24] One explanation for this behavior is that they actively measure and manage the risk exposure of their portfolios by adjusting their balance sheets. For a given amount of equity, an increase in asset prices will lower a firm's measured risk exposure and allow it to expand its balance sheet, such as by increasing its debt to buy more assets. Because measured risk typically is low during booms and high during busts, the firm's efforts to control its risk will lead to procyclical leverage. Another possible factor leading financial institutions to manage their leverage procyclically is their use of fair value accounting to revalue their trading assets periodically at current market values.[25] When asset prices rise, financial institutions holding the assets recognize a gain that increases their equity and decreases their leverage ratio. In turn, the institutions will seek profitable ways to use their increase in equity by expanding their balance sheets and thereby increasing their leverage. Consistent with this research, the ratio of assets to equity for five large broker-dealer holding companies, in aggregate, increased from an average ratio of around 22 to 1 in 2002 to around 30 to 1 in 2007 (see fig. 4).[26] In contrast, the ratio of assets to equity for five large bank holding companies, in aggregate, was relatively flat during this period (see fig. 5). As discussed in the background, the ratio of assets to equity treats all assets as equally risky and does not capture off-balance sheet risks.

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[22] For a discussion of embedded leverage in CDOs, see The Joint Forum, Credit Risk Transfer, Basel Committee on Banking Supervision (Basel, Switzerland: October 2004).

[23] We use the term "securities firms" generally to refer to the holding companies of broker-dealers.

[24] See, for example, Adrian, Tobias, and Hyun Song Shin, "Liquidity, Financial Cycles and Monetary Policy," *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, vol. 14, no. 1, January/February 2008.

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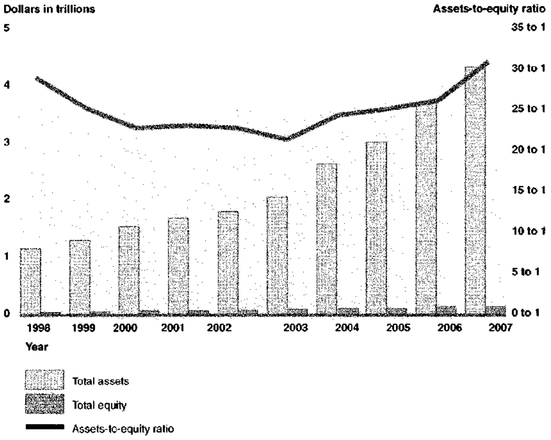
[25] Fair value accounting, also called "mark-to-market," is a way to measure assets and liabilities that appear on a company's balance sheet and income statement. Measuring companies' assets and liabilities at fair value may affect their income statement. For more detailed information, see SEC's Office of Chief Accountant and Division of Corporate Finance, "Report and Recommendations Pursuant to Section 133 of the Emergency Economic Stabilization Act of 2008: Study on Mark-To-Market Accounting" (Washington, D.C.: Dec. 30, 2008).

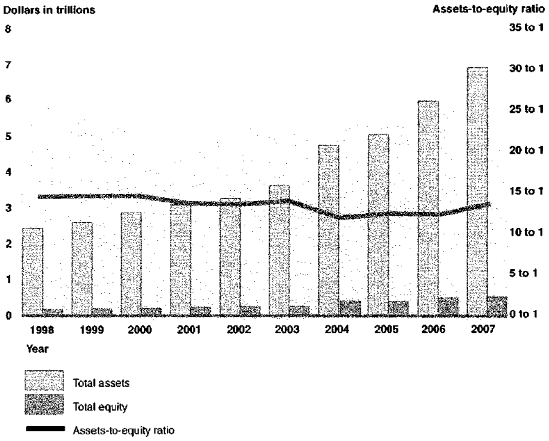
[26] The 30-to-1 ratio of assets to equity is not unprecedented. In 1998, four of the five broker-dealer holding companies had assets-to-equity ratio equal to or greater than 30 to 1.

Figure 4: Total Assets, Total Equity, and Leverage (Assets-to-Equity) Ratio in Aggregate for Five Large U.S. Broker-Dealer Holding Companies, 1998 to 2007



Source: GAO analysis of annual report data for Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley.

Figure 5: Total Assets, Total Equity, and Assets-to-Equity Ratio in Aggregate for Five Large U.S. Bank Holding Companies, 1998 to 2007



Source: GAO analysis of annual report and Federal Reserve Y-9C data for Bank of America, Citigroup, JPMorgan Chase, Wachovia, and Wells Fargo.

The securitization of subprime mortgages and other loans can enable banks and securities firms to transfer credit risk from their balance sheets to parties more willing or able to manage that risk. However, the current crisis has revealed that much of the subprime mortgage exposure and losses have been concentrated among leveraged financial institutions, including banks, securities firms, and hedge funds.[27] For example, some banks and securities firms ended up with large exposures because they (1) were holding mortgages or mortgage-related securities for trading or investment purposes, (2) were holding mortgages or mortgage-related securities in inventory, or warehouses, that they planned to securitize but could not do so after the crisis began, or (3) brought onto their balance sheets mortgage-related securities held by SPEs. According to an equity analyst report, 10 large banks and securities firms had over $24 billion and $64 billion in writedowns in the third and fourth quarters of 2007, respectively.[28] Importantly, higher leverage magnifies market risk and can magnify liquidity risk if leveraged firms experiencing losses are forced to sell assets under adverse market conditions.

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[27] See, for example, David Greenlaw, Jan Hatzius, Anil K. Kashyap, and Hyun Song Shin, "Leveraged Losses: Lessons from the Mortgage Meltdown," paper for the U.S. Monetary Policy Forum (2008).

As their mortgage-related and other losses grew after the onset of the crisis, banks, securities firms, hedge funds, and other financial institutions have attempted to deleverage and reduce their risk. Deleveraging can cover a range of strategies, including raising new equity, reducing dividend payouts, diversifying sources of funds, selling assets, and reducing lending. After the crisis began, U.S. banks and securities firms initially deleveraged by raising more than $200 billion in new capital from private sources and sovereign wealth funds.[29] However, raising capital began to be increasingly difficult in the subsequent period, and financial institutions have deleveraged by selling assets, including financial instruments and noncore businesses. For example, in the fourth quarter of 2008, broker-dealers reduced assets by nearly $785 billion and banks reduced bank credit by nearly $84 billion.

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[28] Meredith Whitney, Kaimon Chung, and Joseph Mack, "No Bad Bank Please," Oppenheimer Equity Research Industry Update, Financial Institutions (New York: Jan. 29, 2009).

[29] Sovereign wealth funds generally are pools of government funds invested in assets in other countries.

Some Studies Suggested That Deleveraging Could Have Led to Downward Spirals in Asset Prices, but Other Theories also May Explain Price Declines

Some studies we reviewed highlighted the possibility that deleveraging through asset sales by financial institutions could trigger downward spirals in asset prices and contribute to a financial crisis.[30] These studies generally build on a broader theory that holds a market disruption, such as a sharp drop in asset prices, can be a source of systemic risk under certain circumstances.[31] Today, the securities markets, rather than banks, are the primary source of financial intermediation—the channeling of capital to investment opportunities. For example, in 1975, banks and thrifts held 56 percent of the total credit to households and businesses; by 2007, they held less than 30 percent.[32] To function efficiently, the securities markets need market liquidity, generally defined as the ability to buy and sell a particular asset without significantly affecting its price. According to the theory, a sharp decline in an asset's price can become self-sustaining and lead to a financial market crisis. Following a sharp decline in an asset's price, investors normally will buy the asset after they deem its price has dropped enough and help stabilize the market, but in times of crisis, investors are unable or unwilling to buy the asset. As the asset's price declines, more investors sell and push the price lower. At the extreme, the asset market's liquidity dries up and market gridlock takes hold. However, not all academics subscribe to this theory, but because the alternative theories are largely beyond the scope of our work, we only discuss them briefly.

Some studies we reviewed suggested that deleveraging through asset sales can lead to a downward asset spiral during times of market stress when market liquidity is low. Following a drop in an asset's price, one or more financial institutions may sell the asset. As noted above, certain financial institutions tend to adjust their balance sheets in a procyclical manner and, thus, may react in concert to a drop in an asset's price by selling the asset. When market liquidity is low, asset sales may cause further price declines. Under fair value accounting, financial institutions holding the asset will revalue their positions based on the asset's lower market value and record a loss that reduces their equity. For leveraged institutions holding the asset, the impact of their losses on capital will be magnified. To lower their leverage or risk, the institutions may sell more of their asset holdings, which can cause the asset's price to drop even more and induce another round of selling. In other words, when market liquidity is low, namely in times of market stress, asset sales establish lower market prices and result in financial institutions marking down their positions—potentially creating a reinforcing cycle of deleveraging. In the extreme, this downward asset spiral could cause the asset's price to be set below its fundamental value, or at a "fire sale" price.

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[30] See, for example, Markus K. Brunnermeier, "Deciphering the 2007-08 Liquidity and Credit Crunch," *Journal of Economic Perspectives* 23, no. 1 (2009), pp. 77-100; Greenlaw et al. (2008); and Anil K., Kashyap, Raghuram G. Rajan, and Jeremy C. Stein, "Rethinking Capital Regulation," paper prepared for Federal Reserve Bank of Kansas City symposium on "Maintaining Stability in a Changing Financial System," Jackson Hole, Wyoming, August 21-23, 2008 (September 2008).

[31] Darryll Hendricks, John Kambhu, and Patricia Mosser, "Systemic Risk and the Financial System, Appendix B: Background Paper," *Federal Reserve Bank of New York Economic Policy Review* (November 2007).

[32] A full analysis of the role played by banks in financial intermediation would need to consider the share of credit intermediated or securitized by affiliates, subsidiaries, and sponsored investment vehicles of bank holding companies and financial holding companies.

Some studies we reviewed also suggested that deleveraging through asset sales could lead to a downward asset spiral when funding liquidity is low. In contrast to market liquidity, which is an asset-specific characteristic, funding liquidity generally refers to the availability of funds in the market that firms can borrow to meet their obligations. For example, financial institutions can increase their leverage by using secured or collateralized loans, such as repurchase agreements, to fund assets. Under such transactions, borrowers post securities with lenders to secure their loans. Lenders typically will not provide a loan for the full market value of the posted securities, with the difference called a margin or haircut. This deduction protects the lenders against default by the borrowers. When the prices of assets used to secure or collateralize loans decline significantly, borrowers may be required to post additional collateral, for example, if the value of the collateral falls below the loan amount or if a lender increased its haircuts.[33] Leveraged borrowers may find it difficult to post additional collateral, in part because declining asset prices also could result in losses that are large relative to their capital. If borrowers faced margin calls, they could be forced to sell some of their other assets to obtain the cash collateral. If the borrowers cannot meet their margin calls, the lenders may take possession of the assets and sell them. When market liquidity is low, such asset sales may cause the asset prices to drop more. If that occurred, other firms that have borrowed against the same assets could face margin calls to post more collateral, which could lead to another round of asset sales and subsequent price declines. Moreover, asset spirals stemming from reduced market or funding liquidity can reinforce each other.

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[33] In addition to increases in haircuts, other factors can cause liquidity stress. For example, financial institutions negotiate margins on OTC derivatives to protect themselves from the risk of counterparty default. Changes in the value of OTC derivatives can result in margin calls and result in liquidity stress.

Importantly, other theories that do not involve asset spirals caused by deleveraging through asset sales provide possible explanations for the sharp price declines in mortgage-related securities and other financial instruments. Moreover, as the crisis is complex, no single theory likely is to explain in full what occurred or necessarily rule out other explanations. Because such theories are largely beyond the scope of our work, we discuss them only in brief. First, given the default characteristics of the mortgages underlying their related securities and falling housing prices, the current valuations of such securities may reflect their true value, not "fire sale" prices. While there may have been some overreaction, this theory holds that low market prices may result from asset prices reverting to more reasonable values after a period of overvaluation. Second, the low prices of mortgage-related securities and other financial instruments may have resulted from the uncertainty surrounding their true value. This theory holds that investors may lack the information needed to distinguish between the good and bad securities and, as a result, discount the prices of the good securities.[34] In the extreme, investors may price the good securities far below their true value, leading to a collapse of the market. These two theories and the deleveraging hypothesis may provide some insight into how the financial crisis has unfolded and are not mutually exclusive. Nonetheless, at this juncture, it is difficult to determine whether a return to fundamentals, uncertainty, or forced asset sales played a larger causal role.

Studies Suggested That Deleveraging Could Have a Negative Effect on Economic Growth

In addition to deleveraging by selling assets, banks and broker-dealers can deleverage by restricting new lending as their own financial condition deteriorates, such as to preserve their capital and protect themselves against future losses. However, the studies we reviewed stated that this deleveraging strategy raises concerns because of the possibility it may slow economic growth.[35] In short, the concern is that banks, because of their leverage, will need to cut back their lending by a multiple of their credit losses to restore their balance sheets or capital-to-asset ratios. The contraction in bank lending can lead to a decline in consumption and investment spending, which reduces business and household incomes and negatively affects the real economy. Moreover, rapidly declining asset prices can inhibit the ability of borrowers to raise money in the securities markets.

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[34] The seminal paper on this issue is Akerlof, George A., "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *Quarterly Journal of Economics*, 84(3), pp. 488-500, 1970.

One study suggested that the amount by which banks reduce their overall lending will be many times larger than their mortgage-related losses.[36] For example, the study estimated that if leveraged institutions suffered about $250 billion in mortgage-related losses, it would lead them to reduce their lending by about $1 trillion. However, these results should be interpreted with caution given that such estimates are inherently imprecise and subject to great uncertainty. Moreover, a portion of any reduction in bank lending could be due to reasons independent of the need to deleverage, such as a decline in the creditworthiness of borrowers, a tightening of previously lax lending standards, or the collapse of securitization markets.[37] In commenting on the study, a former Federal Reserve official noted that banks are important providers of credit but a contraction in their balance sheets would not necessarily choke off all lending.[38] Rather, he noted that a key factor in the current crisis is the sharp decline in securities issuances, and the decline has to be an important part of the story of why the current financial market turmoil is affecting economic activity. In summary, the Federal Reserve official said that the mortgage credit losses are a problem because they are hitting bank balance sheets at the same time that the securitization market is experiencing difficulties. As mentioned above, the securities markets have played an increasingly dominant role over banks in the financial intermediation process.

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[35] See, for example, Devlin, Will, and Huw McKay, The Macroeconomic Implications of Financial "Deleveraging," Economic Roundup, Issue 4, 2008; Greenlaw et al. (2008); and Kashyup et al. (2008). Devlin and Hew (2008) note that there is a large and growing body of empirical evidence to suggest that shocks to a bank capital-to-asset ratios that lead to a contraction in the availability of credit within an economy can have large and long-lasting economic effects.

[36] Greenlaw et al. (2008).

[37] On the other hand, any decline in lending may be partially offset by the Troubled Asset Relief Program, the Term Asset-Backed Securities Loan Facility, or other monetary and fiscal policies designed to mitigate the effects of the financial crisis.

[38] Frederic S. Mishkin, Governor of the Board of the Federal Reserve System, Speech on "Leveraged Losses: Lessons from the Mortgage Meltdown," at the U.S. Monetary Policy Forum (New York, N.Y.: Feb. 29, 2008).

Regulators and Market Participants Had Mixed Views about the Effects of Deleveraging in the Current Crisis

Officials from federal financial regulators, two securities firms, a bank, and a credit rating agency whom we interviewed had mixed views about the effects of deleveraging by financial institutions in the current crisis. Nearly all of the officials told us that large banks and securities firms generally have sought to reduce their risk exposures since late 2007, partly in response to liquidity pressures. The institutions have used a number of strategies to deleverage, including raising new capital; curtailing certain lines of business based on a reassessment of their risk and return; and selling assets, including trading assets, consumer and commercial loans, and noncore businesses. Regulatory officials said that hedge funds and other asset managers, such as mutual funds, also have deleveraged by selling assets to meet redemptions or margin calls. According to officials at a securities firm, raising capital and selling financial assets was easier in the beginning of the crisis, but both became harder to do as the crisis continued. Regulatory and credit rating agency officials also said that financial institutions have faced challenges in selling mortgages and other loans that they planned to securitize, because the securitization markets essentially have shut down during the crisis.

The regulators and market participants we interviewed had mixed views on whether sales of financial assets contributed to a downward price spiral. Officials from one bank and the Federal Reserve staff said that due to the lack of market liquidity for some instruments and the unwillingness of many market participants to sell them, declines in prices that may be attributed to market-driven asset spirals generally resulted from the use of models to price assets in the absence of any sales. Federal Reserve staff also said that it is hard to attribute specific factors as a cause of an observed asset spiral because of the difficulty in disentangling the interacting factors that can cause financial asset prices to move down. In contrast, officials from two securities firms and a credit rating agency, and staff from SEC and OCC told us that asset spirals occurred in certain mortgage and other debt markets. The securities firm officials said that margin calls forced sales in illiquid markets and caused the spirals. Officials from one securities firm said that financial institutions, such as hedge funds, generally sought to sell first those financial assets that were hardest to finance, which eventually caused their markets to become illiquid. The absence of observable prices for such assets then caused their prices to deteriorate even more. According to the securities firm officials, firms that needed to sell assets to cover losses or meet margin calls helped to drive such asset sales. OCC staff attributed some of the downward price spirals to the loss of liquidity in the securitization markets. They said that traditional buyers of securitized assets became sellers, causing the securitization markets to become dislocated.

As suggested in an April 2008 testimony by the former president of the Federal Reserve Bank of New York, reduced funding liquidity may have resulted in a downward price spiral during the current crisis:

> Asset price declines—triggered by concern about the outlook for economic performance—led to a reduction in the willingness to bear risk and to margin calls. Borrowers needed to sell assets to meet the calls; some highly leveraged firms were unable to meet their obligations and their counterparties responded by liquidating the collateral they held. This put downward pressure on asset prices and increased price volatility. Dealers raised margins further to compensate for heightened volatility and reduced liquidity. This, in turn, put more pressure on other leveraged investors. A self-reinforcing downward spiral of higher haircuts forced sales, lower prices, higher volatility and still lower prices.[39]

Similarly, in its white paper on the Public-Private Investment Program, Treasury has indicated that deleveraging through asset sales has led to price spirals:

> The resulting need to reduce risk triggered a wide-scale deleveraging in these markets and led to fire sales. As prices declined further, many traditional sources of capital exited these markets, causing declines in secondary market liquidity. As a result, we have been in a vicious cycle in which declining asset prices have triggered further deleveraging and reductions in market liquidity, which in turn have led to further price declines. While fundamentals have surely deteriorated over the past 18-24 months, there is evidence that current prices for some legacy assets embed substantial liquidity discounts.[40]

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[39] Timothy F. Geithner, "Actions by the New York Fed in Response to Liquidity Pressures in Financial Markets," Testimony before the U.S. Senate Committee on Banking, Housing and Urban Affairs (Washington, D.C.: Apr. 3, 2008).

[40] Treasury, Public-Private Investment Program, $500 Billion to $1 Trillion Plan to Purchase Legacy Assets, White Paper.

FDIC and OCC staff and officials from a credit rating agency told us that some banks have tightened their lending standards for certain types of loans, namely those with less-favorable risk-adjusted returns. Such loans include certain types of residential and commercial mortgages, leverage loans, and loans made to hedge funds. OCC staff said that some banks began to tighten their lending standards in 2007, meaning that they would not be making as many marginal loans, and such action corresponded with a decline in demand for loans. According to credit rating officials, banks essentially have set a target of slower growth for higher-risk loans that have performed poorly and deteriorated their loan portfolios. In addition, OCC and credit rating officials said that the largest banks rely heavily on their ability to securitize loans to help them make such loans. To that end, they said that the securitization markets need to open up and provide funding.

As we have discussed in our prior work, since the crisis began, federal regulators and authorities have undertaken a number of steps to facilitate financial intermediation by banks and the securities markets.[41] To help provide banks with funds to make loans, Treasury, working with the regulators, has used its authority under the act to inject capital into banks so that they would be stronger and more stable. Similarly, the Federal Reserve has reduced the target interest rate to close to zero and has implemented a number of programs designed to support the liquidity of financial institutions and foster improved conditions in financial markets. These programs include provision of short-term liquidity to banks and other financial institutions and the provision of liquidity directly to borrowers and investors in key credit markets. To support the functioning of the credit markets, the Federal Reserve also has purchased longer-term securities, including government-sponsored enterprise debt and mortgage-backed securities. In addition, FDIC has created the Temporary Liquidity Guarantee Program, in part to strengthen confidence and encourage liquidity in the banking system by guaranteeing newly issued senior unsecured debt of banks, thrifts, and certain holding companies.

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[41] See, for example, GAO-09-504.

Regulators Limit Financial Institutions' Use of Leverage Primarily Through Regulatory Capital Requirements

Federal financial regulators generally have imposed capital and other requirements on their regulated institutions as a way to limit excessive use of leverage and ensure the stability of the financial system and markets. Federal banking and thrift regulators have imposed minimum risk-based capital and non-risk-based leverage ratios on their regulated institutions. In addition, they supervise the capital adequacy of their regulated institutions through ongoing monitoring, including on-site examinations and off-site tools. Bank holding companies are subject to capital and leverage ratio requirements similar to those for banks.[42] Thrift holding companies are not subject to such requirements; rather, capital levels of thrift holding companies are individually evaluated based on each company's risk profile. SEC primarily uses its net capital rule to limit the use of leverage by broker-dealers. Firms that had participated in SEC's now defunct CSE program calculated their risk-based capital ratios at the holding company level in a manner generally consistent with the method banks used.[43] Other financial institutions, such as hedge funds, use leverage but, unlike banks and broker-dealers, typically are not subject to regulatory capital requirements; instead, market discipline plays a primary role in limiting leverage. Finally, the Federal Reserve regulates the use of securities as collateral to finance security purchases, but federal financial regulators told us that such credit did not play a significant role in the buildup of leverage leading to the current crisis.

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[42] Bank holding companies are permitted to include certain debt instruments in regulatory capital that are impermissible for insured banks and, as discussed below, are not subject to statutory Prompt Corrective Action.

[43] Under its CSE program, SEC supervised broker-dealer holding companies—Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, and Morgan Stanley—on a consolidated basis. Following the sale of Bear Stearns to JPMorgan Chase, the Lehman Brothers bankruptcy filing, and the sale of Merrill Lynch to Bank of America, the remaining CSEs opted to become bank holding companies subject to Federal Reserve oversight. SEC terminated the CSE program in September 2008 but continues to oversee these firms' registered broker-dealer subsidiaries.

Federal Banking and Thrift Regulators Have Imposed Minimum Capital and Leverage Ratios on Their Regulated Institutions to Limit the Use of Leverage

Federal banking and thrift regulators (Federal Reserve, FDIC, OCC, and OTS) restrict the excessive use of leverage by their regulated financial institutions primarily through minimum risk-based capital requirements established under the Basel Accord and non-risk based leverage requirements. If a financial institution falls below certain capital requirements, regulators can impose certain restrictions, and must impose others, and thereby limit a financial institution's use of leverage. Under the capital requirements, banks and thrifts are required to meet two risk-based capital ratios, which are calculated by dividing their qualifying capital (numerator) by their risk-weighted assets (denominator).[44] Total capital consists of core capital, called Tier 1 capital, and supplementary capital, called Tier 2 capital.[45] Total risk-weighted assets are calculated using a process that assigns risk weights to the assets according to their credit and market risks. This process is broadly intended to assign higher risk weights and require banks to hold more capital for higher-risk assets. For example, cash held by a bank or thrift is assigned a risk weight of 0 percent for credit risk, meaning that the asset would not be counted in a bank's total risk-weighted assets and, thus, would not require the bank or thrift to hold any capital for that asset. OTC derivatives also are included in the calculation of total risk-weighted assets. Banks and thrifts are required to meet a minimum ratio of total capital to risk-weighted assets of 8 percent, with at least 4 percent taking the form of Tier 1 capital. However, regulators told us that they can recommend that their institutions hold capital in excess of the minimum requirements, if warranted (discussed in more detail below).

Banks and thrifts also are subject to minimum non-risk-based leverage standards, measured as a ratio of Tier 1 capital to total assets. The minimum leverage requirement to be adequately capitalized is between 3 and 4 percent, depending on the type of institution and a regulatory assessment of the strength of its management and controls.[46] Leverage ratios have been part of bank and thrift regulatory requirements since the 1980s, and regulators continued to use the leverage ratios after the introduction of risk-based capital requirements to provide a cushion against risks not explicitly covered in the risk-based capital requirements, such as operational weaknesses in internal policies, systems, and controls or model risk or related measurement risk. The greater level of capital required by the risk-based or leverage capital calculation is the binding overall minimum requirement on an institution.

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[44] The Prompt Corrective Action regulations and the key regulatory capital requirements for banks and thrifts are outlined in 12 C.F.R. pts. 3, 6 (OCC); 208 (FRB); 325 (FDIC) and 565, 567 (OTS).

[45] Regulations limit what may be included in Tier 1 and Tier 2 capital. Tier 1 capital can include common stockholders' equity, noncumulative perpetual preferred stock, and minority equity investments in consolidated subsidiaries. For example, see 12 C.F.R. pt. 325, app. A (I)(A)(1). The remainder of a bank's total capital also can consist of tier 2 capital which can include items such as general loan and lease loss allowances (up to a maximum of 1.25 percent of risk-weighted assets), cumulative preferred stock, certain hybrid (debt/equity) instruments, and subordinated debt with a maturity of 5 years or more. For example, see 12 C.F.R. pt. 325, app. A(I)(A)(2).

Federal banking regulators are required to take increasingly severe actions as an institution's capital deteriorates under Prompt Corrective Action (PCA).[47] These rules apply to banks and thrifts but not to bank holding companies. Under PCA, regulators are to classify insured depository institutions into one of five capital categories based on their level of capital: well-capitalized, adequately capitalized, undercapitalized, significantly undercapitalized, and critically undercapitalized.[48] Institutions that fail to meet the requirements to be classified as well or adequately capitalized generally face several mandatory restrictions or requirements. Specifically, the regulator will require an undercapitalized institution to submit a capital restoration plan detailing how it is going to become adequately capitalized. Moreover, no insured institution may pay a dividend if it would be undercapitalized after the dividend. When an institution becomes significantly undercapitalized, regulators are required to take more forceful corrective measures, including requiring the sale of equity or debt, restricting otherwise allowable transactions with affiliates, or restricting the interest rates paid on deposits. After an institution becomes critically undercapitalized, regulators have 90 days to place the institution into receivership or conservatorship or to take other actions that would better prevent or reduce long-term losses to the insurance fund.[49]

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[46] Banks holding the highest supervisory rating have a minimum leverage ratio of 3 percent; all other banks must meet a leverage ratio of at least 4 percent. Bank holding companies that have adopted the Market Risk Amendment or hold the highest supervisory rating are subject to a 3 percent minimum leverage ratio; all other bank holding companies must meet a 4 percent minimum leverage ratio. According to FDIC officials, in practice, a bank with a 3 to 4 percent leverage ratio would be less than well capitalized for Prompt Corrective Action purposes (discussed below) and would be highly unlikely to be assigned the highest supervisory rating.

[47] 12 U.S.C. § 1831o. The Federal Deposit Insurance Act, as amended by the Federal Deposit Insurance Corporation Improvement Act of 1991, requires federal regulators to take specific action against banks and thrifts that have capital levels below minimum standards.

[48] Regulators use three different capital measures to determine an institution's capital category: (1) a total risk-based capital measure, (2) a Tier 1 risk-based capital measure, and (3) a leverage (or non-risk-based) capital measure. For additional information, see GAO, *Deposit Insurance: Assessment of Regulators' Use of Prompt Corrective Action Provisions and FDIC's New Deposit Insurance Program*, GAO-07-242 (Washington, D.C.: Feb. 15, 2007).

Regulators Can Use Various Oversight Approaches to Monitor and Enforce Capital Adequacy

Federal bank and thrift regulators can supervise the capital adequacy of their regulated institutions by tracking the financial condition of their regulated entities through on-site examinations and continuous monitoring for the larger institutions.[50] According to Federal Reserve officials, the risk-based capital and leverage measures are relatively simple ratios and are not sufficient, alone, for assessing overall capital adequacy. In that regard, the supervisory process enables examiners to assess the capital adequacy of banks at a more detailed level. On-site examinations serve to evaluate the institution's overall risk exposure and focus on an institution's capital adequacy, asset quality, management and internal control procedures, earnings, liquidity, and sensitivity to market risk (CAMELS).[51] For example, the examination manual directs Federal Reserve examiners to evaluate the internal capital management processes and assess the risk and composition of the assets held by banks. Similarly, OCC examiners told us that they focused on the capital levels of large banks in their examinations during the current crisis and raised concerns about certain banks' weak results from the stress testing of their capital adequacy.

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[49] Any determination to take other action in lieu of receivership or conservatorship for a critically undercapitalized institution is effective for no more than 90 days. After the 90-day period, the regulator must place the institution in receivership or conservatorship or make a new determination to take other action. Each new determination is subject to the same 90-day restriction. If the institution is critically undercapitalized, on average, during the calendar quarter beginning 270 days after the date on which the institution first became critically undercapitalized, the regulator is required to appoint a receiver for the institution. Section 38 contains an exception to this requirement, if, among other things, the regulator and chair of the FDIC Board of Directors both certify that the institution is viable and not expected to fail.

[50] Banks usually are examined at least once during each 12-month period and more frequently if they have serious problems. In addition, well-capitalized banks with total assets of less than $250 million can be examined on an 18-month cycle.

[51] At each examination, examiners assign a supervisory CAMELS rating, which assesses six components of an institution's financial health: capital, asset quality, management, earnings, liquidity, and sensitivity to market risk. An institution's CAMELS rating is known directly only by the institution's senior management and appropriate regulatory staff. Regulators never publicly release CAMELS ratings, even on a lagged basis.

Federal bank and thrift regulatory officials told us that they also can encourage their regulated institutions to hold more than the minimum required capital, if warranted. For example, if examiners find that an institution is exceeding its capital ratios but holding a large share of risky assets, the examiners could recommend that the bank enhance its capital. As stated in the Federal Reserve's examination manual, because risk-based capital does not take explicit account of the quality of individual asset portfolios or the range of other types of risks to which banks may be exposed, banks generally are expected to operate with capital positions above the minimum ratios. Moreover, banks with high levels of risk also are expected to maintain capital well above the minimum levels. According to OTS officials, under certain circumstances, OTS can require an institution to increase its capital ratio, whether through reducing its risk-weighted assets, boosting its capital, or both. For example, OTS could identify through its examinations that downgraded securities could be problematic for a firm. OTS can then require a troubled institution under its supervisory authority, through informal and formal actions, to increase its capital ratio. Moreover, the charter application process for becoming a thrift institution can provide an opportunity to encourage institutions to increase their capital. Bank and thrift regulators also can use their enforcement process, if warranted, to require a bank or thrift to take action to address a capital-adequacy weakness.

Federal bank and thrift regulators told us that they also use off-site tools to monitor the capital adequacy of institutions. For example, examiners use Consolidated Reports of Condition and Income (Call Report) and Thrift Financial Report data to remotely assess the financial condition of banks and thrifts, respectively, and to plan the scope of on-site examinations.[52] Regulators also use computerized monitoring systems that use Call Report data to compute, for example, financial ratios, growth trends, and peer-group comparisons. OCC officials with whom we spoke said that they review Call Reports to ensure that banks are calculating their capital ratios correctly. FDIC officials also told us that they used the data on depository institutions to conduct informal analyses to assess the potential impact a credit event or other changes could have on banks' capital adequacy. They said that FDIC has performed such analyses on bank holdings of various types of mortgage-related securities.

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[52] All FDIC-insured banks and savings institutions that are supervised by FDIC, OCC, or the Federal Reserve must submit quarterly Consolidated Reports on Condition and Income (Call Reports), which contain a variety of financial information, including capital amounts. FDIC-insured thrifts supervised by OTS must file similar reports, called Thrift Financial Reports.

In addition, federal bank and thrift regulators also can conduct targeted reviews, such as those related to capital adequacy of their regulated entities. For example, in 2007, a horizontal study led by the Federal Reserve Bank of New York examined how large banks determined their economic capital, which banks use to help assess their capital adequacy and manage risk. Federal Reserve examiners told us that they typically do not conduct horizontal studies on leverage, because they cover the institutions' use of leverage when routinely supervising their institutions' capital adequacy. Federal Reserve officials told us supervisors believe that capital adequacy is better reviewed and evaluated through continuous monitoring processes that evaluate capital adequacy against the individual risks at a firm and compare capital and risk levels across a portfolio of institutions, rather than through the use of horizontal exams that would typically seek to review banks' processes.

Bank Holding Companies Are Subject to Capital and Leverage Ratio Requirements Similar to Those for Banks, but Thrift Holding Companies Are Not

Bank holding companies are subject to risk-based capital and leverage ratio requirements, which are similar to those applied to banks except for the lack of applicability of PCA and the increased flexibility afforded to bank holding companies to use debt instruments in regulatory capital. The Federal Reserve requires that all bank holding companies with consolidated assets of $500 million or more meet risk-based capital requirements developed in accordance with the Basel Accord. In addition, it has required, with the other bank supervisors, revised capital adequacy rules to implement Basel II for the largest bank holding companies.[53] To be considered well-capitalized, a bank holding company with consolidated assets of $500 million or more generally must have a Tier 1 risk-based capital ratio of 4 percent, and a minimum total risk-based capital ratio of 8 percent, and a leverage ratio of at least 4 percent.[54]

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[53] On December 7, 2007, the banking regulatory agencies issued a final rule entitled "Risk-Based Capital Standards: Advanced Capital Adequacy Framework - Basel II." 72 Fed. Reg. 69288 (Dec. 7, 2007). In addition to this final rule, the agencies issued a proposed revision to the market risk capital rule. 71 Fed. Reg. 55958 (Sept. 25, 2006).

[54] Well-capitalized for bank holding companies does not have the same meaning as in a PCA context; it is used in the application process.

According to OTS officials, thrift holding companies generally are not subject to minimum capital or leverage ratios because of their diversity. Rather, capital levels of thrift holding companies are individually evaluated based on each company's risk profile. OTS requires that thrift holding companies hold a "prudential" level of capital on a consolidated basis to support the risk profile of the holding company.[55] For its most complex firms, OTS requires a detailed capital calculation that includes an assessment of capital adequacy on a groupwide basis and identification of capital that might not be available to the holding company or its other subsidiaries, because it is required to be held by a specific entity for regulatory purposes. Under this system, OTS benchmarks thrift holding companies against peer institutions that face similar risks.

In supervising the capital adequacy of bank and thrift holding companies, the Federal Reserve and OTS are to focus on those business activities posing the greatest risk to holding companies and managements' processes for identifying, measuring, monitoring, and controlling those risks. The Federal Reserve's supervisory cycle for large complex bank holding companies generally begins with the development of a systematic risk-focused supervisory plan, which it then implements, and ends with a rating of the firm. The rating includes an assessment of holding companies' risk management and controls; financial condition, including capital adequacy; and impact on insured depositories.[56] In addition, the Federal Reserve requires that all bank holding companies serve as a source of financial and managerial strength to their subsidiary banks. Similarly, OTS applies the CORE (Capital, Organizational Structure, Risk Management, and Earnings) rating system for large complex thrift holding companies. CORE focuses on consolidated risks, internal controls, and capital adequacy rather than focusing solely on the holding company's impact on subsidiary thrifts. In reviewing capital adequacy, particularly in large, complex thrift holding companies, OTS considers the risks inherent in the enterprise's capital to absorb unexpected losses, support the level and composition of the parent company's and subsidiaries' debt, and support business plans and strategies.

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[55] Under the Homeowners' Loan Act of 1933, as amended, companies that own or control a savings association are subject to supervision by OTS. 12 U.S.C. § 1467a.

[56] Each bank holding company is assigned a composite rating (C) based on an evaluation and rating of its managerial and financial condition and an assessment of future potential risk to its subsidiary depository institution(s). The main components of the rating system represent: Risk Management (R); Financial Condition (F); and potential Impact (I) of the parent company and nondepository subsidiaries on the subsidiary depository institution(s). The Impact rating focuses on downside risk—that is, on the likelihood of significant negative impact on the subsidiary depository institutions. A fourth component rating, Depository Institution (D), will generally mirror the primary regulator's assessment of the subsidiary depository institution(s).

The Federal Reserve and OTS have a range of formal and informal actions they can take to enforce their regulations for holding companies. Federal Reserve officials noted that the law provides explicit authority for any formal actions that may be warranted and incentives for bank holding companies to address concerns promptly or through less formal enforcement actions, such as corrective action resolutions adopted by the company's board of directors or memoranda of understanding in which the relevant Federal Reserve bank enters.[57] Similarly, OTS also has statutory authority to take enforcement actions against thrift holding companies and any subsidiaries of those companies.[58]

Both the Federal Reserve and OTS also monitor the capital adequacy of their respective regulated holding companies using off-site tools. For example, the Federal Reserve noted that it obtains financial information from bank holding companies in a uniform format through a variety of periodic regulatory reports and uses the data to conduct peer analysis, including a comparison of their capital adequacy ratios. Similarly, according to a June 2008 testimony by an OTS official, OTS in 2008 conducted an extensive review of capital levels at the thrift holding companies and found that savings and loan holding company peer group averages were strong.[59]

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[57] The Federal Reserve's formal enforcement powers for bank holding companies and their nonbank subsidiaries are set forth at 12 U.S.C. § 1818(b)(3).

[58] See 12 U.S.C. § 1467a(g), (i) and 12 U.S.C. § 1818(b)(9).

[59] Senior Deputy Director and Chief Operating Officer, Scott M. Polakoff, before the Subcommittee on Securities, Insurance, and Investment, Committee on Banking, Housing, and Urban Affairs, U.S. Senate (Washington, D.C.: June 19, 2008).

SEC Has Regulated the Use of Leverage by Broker-Dealers Primarily through Its Net Capital Rule

According to SEC staff, the agency regulates the use of leverage by registered broker-dealers primarily through the risk-based measures prescribed in its net capital and customer protection rules.[60] SEC adopted these rules pursuant to its broad authority to adopt rules and regulations regarding the financial responsibility of broker-dealers that it finds necessary in the public interest or for the protection of customers.[61]

Under the net capital rule, broker-dealers are required to maintain a minimum amount of net capital at all times. Net capital is computed in several steps. A broker-dealer's net worth (assets minus liabilities) is calculated using U.S. Generally Accepted Accounting Principles (GAAP). Certain subordinated liabilities are added back to GAAP equity because the net capital rule allows them to count toward capital, subject to certain conditions. Deductions are taken from GAAP equity for assets that are not readily convertible into cash, such as unsecured receivables and fixed assets. The net capital rule further requires prescribed percentage deductions from GAAP equity, called "haircuts." Haircuts provide a capital cushion to reflect an expectation about possible losses on proprietary securities and financial instruments held by a broker-dealer resulting from adverse events. The amount of the haircut on a position is a function of, among other things, the position's market risk liquidity. A haircut is taken on a broker-dealer's proprietary position because the proceeds received from selling assets during liquidation depend on the liquidity and market risk of the assets.

Under the net capital rule, a broker-dealer must at all times have net capital equal to the greater of two amounts: (1) a minimum amount based on the type of business activities conducted by the firm or (2) a financial ratio.[62] The broker-dealers must elect one of two financial ratios: the basic method (based on aggregate indebtness) or the alternative method (based on aggregate debit items). That is, broker-dealers must hold different minimum levels of capital based on the nature of their business and whether they handle customer funds or securities. According to SEC staff, most broker-dealers that carry customer accounts use the alternative method. Under this method, broker-dealers are required to have net capital equal to the greater of $250,000 or 2 percent of aggregate debit items, which generally are customer-related receivables, such as cash and securities owned by customers but held by their broker-dealers.[63] This amount serves to ensure that broker-dealers have sufficient capital to repay creditors and pay their liquidation expense if they fail.

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[60] SEC has broad authority to adopt rules and regulations regarding the financial responsibility of broker-dealers that it finds are necessary or appropriate in the public interest or for the protection of investors and, pursuant to that authority, adopted the net capital rule (17 C.F.R. § 240.15c3-1) and related rules. 40 Fed. Reg. 29795, 29799 (July 16, 1975). Specifically, the SEC determined that the net capital rule was necessary and appropriate to provide safeguards with respect to the financial responsibility and related practices of brokers or dealers; to eliminate illiquid and impermanent capital; and to assure investors that their funds and securities are protected against financial instability and operational weaknesses of brokers or dealers. *Id.* See also 17 C.F.R. 240.15c3-3.

[61] 15 U.S.C. § 78o(c)(3).

According to SEC staff, the customer protection rule, a separate but related rule, requires broker-dealers to safeguard customer property, so that they can return such property if they failed.[64] The rule requires a broker-dealer to take certain steps to protect the credit balances and securities it holds for customers. Under the rule, a broker-dealer must, in essence, segregate customer funds and fully paid and excess margin securities held by the firm for the accounts of customers. The intent of the rule is to require a broker-dealer to hold customer assets in a manner that enables their prompt return in the event of an insolvency, which increases the ability of the firm to wind down in an orderly self-liquidation and thereby avoid the need for a proceeding under the Securities Investor Protection Act of 1970.[65]

SEC oversees U.S. broker-dealers but delegates some of its authority to oversee broker-dealers to one or more of the various self-regulatory organizations, including the Financial Industry Regulatory Authority

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[62] CFTC imposes capital requirements on futures commission merchants, which are similar to broker-dealers but act as intermediaries in commodity futures transactions. Some firms are registered as both a broker-dealer and futures commission merchant and must comply with both SEC's and CFTC's regulations.

[63] In comparison, under the basic method, broker-dealers must have net capital equal to at least 6 2/3 percent of their aggregate indebtedness. The 6-2/3 percent requirement implies that broker-dealers must have at least $1 of net capital for every $15 of its indebtedness (that is, a leverage constraint). Most small broker-dealers typically use the basic method because of the nature of their business.

[64] See 17 C.F.R. § 240.15c3-3.

[65] Pub. L. No. 91-598, 84 Stat. 1636, codified at 15 U.S.C. §§ 78aaa-78lll.

(FINRA), an SRO that was established in 2007 through the consolidation of NASD and the member regulation, enforcement, and arbitration functions of the New York Stock Exchange (NYSE). SEC and the SROs conduct regularly scheduled target examinations that focus on the risk areas identified in their risk assessments of firms and on compliance with relevant capital and customer protection rules.[66] SEC's internal control risk-management examinations, which started in 1995, cover the top 15 wholesale and top 15 retail broker-dealers and a number of mid-sized broker-dealers with a large number of customer accounts. SEC conducts examinations every 3 years at the largest institutions, while the SROs conduct more frequent examinations of all broker-dealers. For instance, FINRA examines all broker-dealers that carry customer accounts at least once annually. According to SEC and FINRA, they receive financial and risk area information on a regular basis from all broker-dealers. In addition, the largest brokers and those of financial concern provide additional information through monitoring programs and regular meetings with the firms.

SEC Regulated the Use of Leverage by Selected Broker-Dealers under an Alternative Net Capital Rule from 2005 to 2008

From 2005 to September 2008, SEC implemented the voluntary CSE program, in which five broker-dealer holding companies had participated. In 2004, SEC adopted the program by amending its net capital rule to establish a voluntary, alternative method of computing net capital. A broker-dealer became a CSE by applying for an exemption from the net capital rule and, as a condition of the exemption, the broker-dealer holding company consented to consolidated supervision (if it was not already subject to such supervision). According to SEC staff, a broker-dealer electing this alternative method is subject to enhanced net capital, early warning, recordkeeping, reporting, liquidity, and certain other requirements, and must implement and document an internal risk management system. Under the new alternative net capital rule, CSE broker-dealers were permitted to use their internal mathematical risk measurement models, rather than SEC's haircut structure, to calculate their haircuts for the credit and market risk associated with their trading and investment positions. Expecting that firms would be able to lower their haircuts and, in turn, capital charges by using their internal risk models, SEC required as a safeguard that CSE broker-dealers maintain at least $500 million in net capital and at least $1 billion in tentative net capital (equity before haircut deductions). According to SEC staff, because of an early warning requirement set at $5 billion for tentative net capital, CSE broker-dealers effectively had to maintain a minimum of $5 billion in tentative net capital. If a firm fell below that level, it would need to notify SEC, which could require the firm to take remedial action. Recognizing that capital is not synonymous with liquidity, SEC also expected each CSE holding company to maintain a liquid portfolio of cash and highly liquid and highly rated debt instruments in an amount based on its liquidity risk management analysis, which includes stress tests that address, among other things, illiquid assets.[67]

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[66] As part of its oversight, SEC also evaluates the quality of FINRA oversight in enforcing its members' compliance through oversight inspections of FINRA and inspections of broker-dealers. SEC also directly assesses broker-dealer compliance with federal securities laws through special and cause examinations.

In addition to consenting to consolidated regulation, the CSE holding companies agreed to calculate their capital ratio consistent with the Basel II capital standards. SEC expected CSE holding companies to maintain a risk-based capital ratio of not less than 10 percent. According to SEC staff, the 10-percent risk-based capital ratio was the threshold that constituted a well-capitalized institution under the Basel standards and was consistent with the threshold used by banking regulators, but it was not a regulatory requirement. The CSE holding companies were required to notify SEC if they breached or were likely to breach the 10-percent capital ratio. According to SEC staff, if it received such a notification, the staff would have required the CSE holding company to take remedial action. Moreover, SEC staff said that they received and monitored holding company capital calculations on a monthly basis. SEC staff also said that the CSE holding companies were holding capital above the amount needed to meet the 10-percent risk-based capital ratio during the current crisis, except for one institution that later restored its capital ratio.

The holding companies and their broker-dealers that participated in the CSE program were not subject to explicit non-risk based leverage limits before or after SEC created the program. According to SEC staff, the broker-dealers' ability to increase leverage was limited through the application of haircuts on their proprietary positions under the net capital rule. To the extent that the use of their internal models (instead of SEC's haircut structure) by the broker-dealers enabled them to reduce the amount of their haircuts, they could take on larger proprietary positions and increase their leverage. However, SEC staff told us that the broker-dealers generally did not take such action after joining the CSE program. The staff said that the primary sources of leverage for the broker-dealers were customer margin loans, repurchase agreements, and stock lending. According to the staff, these transactions were driven by customers and counterparties, marked daily, and secured by collateral—exposing the broker-dealers to little, if any, market risk. In addition, SEC did not seek to impose a non-risk based leverage limit on CSE holding companies, in part because such a leverage ratio treated all on-balance sheet assets as equally risky and created an incentive for firms to move exposures off-balance sheet. Officials at a former CSE told us that their firm's decision to become a CSE was to provide the firm with another way to measure its capital adequacy. They said the firm did not view the CSE program as a strategy to increase its leverage, although it was able to reduce its broker-dealer's haircuts. According to the officials, the firm's increase in leverage after becoming a CSE likely was driven by market factors and business opportunities. In our prior work on Long-Term Capital Management (a hedge fund), we analyzed the assets-to-equity ratios of four of the five broker-dealer holding companies that later became CSEs and found that three had ratios equal to or greater than 28-to-1 at fiscal year-end 1998, which was higher than their ratios at fiscal year-end 2006 before the crisis began (see fig. 6).[68]

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[67] To assess the adequacy of both capital and liquid assets, SEC staff takes a scenario-based approach. A key premise of the scenario analysis is that during a liquidity stress event, the holding company would not receive additional unsecured funding.

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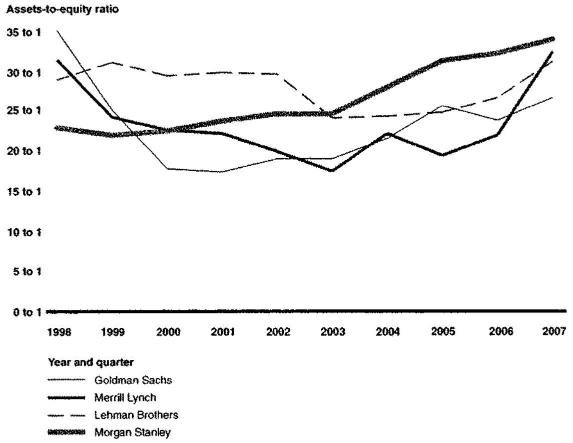
[68] GAO, *Long-Term Capital Management: Regulators Need to Focus Greater Attention on Systemic Risk*, GAO/GGD-00-3 (Washington, D.C.: Oct. 29, 1999). The report did not present the assets-to-equity ratio for Bear Stearns, but its ratio also was above 28 to 1 in 1998.

Figure 6: Ratio of Total Assets to Equity for Four Broker-Dealer Holding Companies, 1998 to 2007



Source: GAO analysis of the firms' annual report data.

SEC's Division of Trading and Markets had responsibility for administering the CSE program. According to SEC staff, the CSE program was modeled on the Federal Reserve's holding company supervision program. SEC staff said that continuous supervision was usually conducted through regular monthly meetings on-site with CSE firm risk managers to monitor liquidity and funding and to review how market and credit risks are identified, quantified, and communicated to senior management and whether senior managers have approved of the risk exposures. Quarterly meetings were held with senior managers from treasury and internal audit. According to SEC staff, these regularly scheduled risk meetings were frequently supplemented by additional on-site meetings and off-site discussions throughout the month. SEC did not rate risk-management systems or use a detailed risk assessment processes to determine areas of highest risk. During the CSE program, SEC staff concentrated their efforts on market, credit, and liquidity risks, because the alternative net capital rule focused on these risks, and on operational risk because of the need to protect investors. Because only five broker-dealer holding companies were subject to SEC's consolidated supervision, SEC staff tailored certain reporting requirements and reviews to focus on activities that posed material risks for that firm. According to SEC staff, the CSE program allowed SEC to conduct reviews across the five firms to gain insights into business areas that were material by risk or balance sheet measures, rapidly growing, posed particular challenges in implementing the Basel regulatory risk-based capital regime, or had some combination of these characteristics. Such reviews resulted in four firms modifying their capital computations.

In September 2008, the former SEC Chairman announced that the agency ended the CSE program. According to the SEC Chairman, the three investments banks formerly designated as CSEs are now part of a bank holding company structure and subject to supervision by the Federal Reserve. The chairman noted that SEC will continue to work closely with the Federal Reserve under a memorandum of understanding between the two agencies but will focus on its statutory obligation to regulate the broker-dealer subsidiaries of the bank holding companies, including the implementation of the alternative net capital computation by certain broker-dealers. While no institutions are subject to SEC oversight at the consolidated level under the CSE program, several broker-dealers within bank holding companies are still subject to the alternative net capital rule on a voluntary basis.[69]

Hedge Funds Generally Are Not Subject to Direct Regulations That Restrict Their Use of Leverage but Face Limitations through Market Discipline

Hedge funds have become important participants in the financial markets and many use leverage, such as borrowed funds and derivatives, in their trading strategies. They generally are structured and operated in a manner that enables them to qualify for exemptions from certain federal securities laws and regulations.[70] Because their investors are presumed to be sophisticated and therefore not require the full protection offered by the securities laws, hedge funds generally have not been subject to direct regulation. As a result, hedge funds typically are not subject to regulatory capital requirements or limited by regulation in their use of leverage. Instead, market discipline has the primary role, supplemented by indirect regulatory oversight of commercial banks and securities and futures firms, in constraining risk taking and leveraging by hedge fund managers (advisers).

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[69] Bear Stearns was acquired by JPMorgan Chase, Lehman Brothers failed, Merrill Lynch was acquired by Bank of America, and Goldman Sachs and Morgan Stanley have become bank holding companies.

[70] Although there is no statutory definition of "hedge fund," the term commonly is used to describe pooled investment vehicles directed by professional managers that often engage in active trading of various types of assets, such as securities and derivatives and are structured and operated in a manner that enables the fund and its advisers to qualify for exemptions from certain federal securities laws and regulations that apply to other investment pools, such as mutual funds.

Market participants (for example, investors, creditors, and counterparties) can impose market discipline by rewarding well-managed hedge funds and reducing their exposure to risky, poorly managed hedge funds. Hedge fund advisers use leverage, in addition to money invested into the fund by investors, to employ sophisticated investment strategies and techniques to generate returns. A number of large commercial banks and prime brokers bear and manage the credit and counterparty risks that hedge fund leverage creates. Typically, hedge funds seeking direct leverage can obtain funding either through margin financing from a prime broker or through the repurchase agreement markets. Exercising counterparty risk-management is the primary mechanism by which these types of financial institutions impose market discipline on hedge funds' use of leverage. The credit risk exposures between hedge funds and their creditors and counterparties arise primarily from trading and lending relationships, including various types of derivatives and securities transactions. Creditors and counterparties of large hedge funds use their own internal rating and credit or counterparty risk management processes and may require additional collateral from hedge funds as a buffer against increased risk exposure. As part of their due diligence, they typically request from hedge funds information such as capital and risk measures; periodic net asset valuation calculations; fees and redemption policy; and annual audited statements along with hedge fund managers' background and track record. Creditors and counterparties can establish credit terms partly based on the scope and depth of information that hedge funds are willing to provide, the willingness of the fund managers to answer questions during on-site visits, and the assessment of the hedge fund's risk exposure and capacity to manage risk. If approved, the hedge fund receives a credit rating and a line of credit. Some creditors and counterparties also can measure counterparty credit exposure on an ongoing basis through a credit system that is updated each day to determine current and potential exposures. As we reported in our earlier work, for market discipline to be effective, (1) investors, creditors, and counterparties must have access to, and act upon, sufficient and timely information to assess a fund's risk profile; (2) investors, creditors, and counterparties must have sound risk-management policies, procedures, and systems to evaluate and limit their credit risk exposures to hedge funds; and (3) creditors and counterparties must increase the costs or decrease the availability of credit to their hedge fund clients as the creditworthiness of the latter deteriorates.[71] Similar to other financial institutions, hedge funds also have had to deleverage. According to the 2008 Global Financial Stability Report by the International Monetary Fund, due to the current financial crisis, margin financing from prime brokers has been cut, and haircuts and fees on repurchase agreements have increased. The combination of these factors has caused average hedge fund leverage to fall to 1.4 times capital (from 1.7 times last year) according to market estimates.

Although hedge funds generally are not directly regulated, many advisers to hedge funds are subject to federal oversight. Under the existing regulatory structure, SEC and CFTC regulate those hedge fund advisers that are registered with them, and SEC, CFTC, as well as the federal bank regulators monitor hedge fund-related activities of other regulated entities, such as broker-dealers and commercial banks. As registered investment advisers, hedge fund advisers are subject to SEC examinations and reporting, record keeping, and disclosure requirements. Similarly, CFTC regulates those hedge fund advisers registered as commodity pool operators or commodity trading advisors.[72] CFTC has authorized the National Futures Association, an SRO, to conduct day-to-day monitoring of such registered entities. In addition, SEC, CFTC, and bank regulators use their existing authorities—to establish capital standards and reporting requirements, conduct risk-based examinations, and take enforcement actions—to oversee activities, including those involving hedge funds, of broker-dealers, futures commission merchants, and banks, respectively. As we recently reported, although none of the regulators we interviewed specifically monitored hedge fund activities on an ongoing basis, regulators generally have increased reviews—by such means as targeted examinations—of systems and policies to mitigate counterparty credit risk at the large regulated entities.[73]

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[71] See GAO, *Hedge Funds: Regulators and Market Participants Are Taking Steps to Strengthen Market Discipline, but Continued Attention Is Needed*, GAO-08-200 (Washington, D.C.: Jan. 24, 2008).

[72] Except as may otherwise be provided by law, a commodity pool operator (CPO) is an individual or organization that operates an enterprise, and, in connection therewith, solicits or receives funds, securities or property from third parties, for the purpose of trading in any commodity for future delivery on a contract market or derivatives execution facility. 7 U.S.C. § 1a(5). A commodity trading advisor (CTA) is, except as otherwise provided by law, any person who, for compensation or profit, (1) directly or indirectly advises others on the advisability of buying or selling any contract of sale of a commodity for future delivery, commodity options or certain leverage transactions contracts, or (2) as part of a regular business, issues analyses or reports concerning the activities in clause (1). 7 U.S.C. § 1a(6). In addition to statutory exclusions to the definition of CPO and CTA, CFTC has promulgated regulations setting forth additional criteria under which a person may be excluded from the definition of CPO or CTA. *See* 17 C.F.R. §§ 4.5 and 4.6 (2007).

Federal banking and securities regulators have established regulatory and supervisory structures to limit and oversee the use of leverage by financial institutions. However, as the financial crisis has unfolded and the regulatory oversight of troubled institutions has been scrutinized, concerns have been raised about the adequacy of such oversight in some areas. For example, in its material loss review on IndyMac Bank, the Treasury Inspector General (IG) found that OTS failed to take PCA action in a timely manner when IndyMac's capital adequacy classification first appeared to haven fallen below minimum standards.[74] In addition, the Treasury IG noted that OTS had given IndyMac satisfactory CAMELS ratings despite a number of concerns about IndyMac's capital levels, asset quality, management and liquidity during 2001 through 2007. Separately, a Federal Reserve official testified in March 2009 that the Federal Reserve has recognized that it needs to improve its communication of supervisory and regulatory policies, guidance, and expectations to those banks it regulates by frequently updating their rules and regulations and more quickly issuing guidance as new risks and concerns are identified.[75] As another example, in its audit of SEC's oversight of CSEs, the SEC IG found that the CSE program failed to effectively oversee these institutions for several reasons, including the lack of an effective mechanism for ensuring that these entities maintained sufficient capital.[76] The SEC IG made a number of recommendations to improve the CSE program. In commenting on the SEC IG report, management of SEC's Division of Trading and Markets stated that the report is fundamentally flawed in its processes, premises, analysis, and key findings and reaches inaccurate, unrealistic, and impracticable conclusions. Although the CSE program has ended, the former SEC Chairman stated in response to the IG report that the agency will look closely at the applicability of the recommendations to other areas of SEC's work.

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[73] See GAO-08-200.

[74] Office of Inspector General, Department of the Treasury, *Safety and Soundness: Material Loss Review of IndyMac Bank, FSB*, OIG-09-032 (Washington, D.C.: Feb. 26, 2009).

[75] Roger T. Cole, Director, Division of Banking Supervision and Regulation, before the Subcommittee on Securities, Insurance, and Investment, Committee on Banking, Housing, and Urban Affairs, U.S. Senate (Washington, D.C.: Mar. 18, 2009).

[76] Office of Inspector General, U.S. Securities and Exchange Commission, *SEC's Oversight of Bear Stearns and Related Entities: The Consolidated Supervised Entity Program*, 446-A (Washington, D.C.: Sept. 25, 2008).

The Federal Reserve Regulates the Use of Credit to Purchase Securities under Regulation T and U, but Regulators Said That Such Credit Did Not Play a Significant Role in the Buildup of Leverage

To increase their leverage, investors can post securities as collateral with broker-dealers, banks, and other lenders to obtain loans to finance security purchases. Historically, such lending has raised concerns that it diverted credit away from productive uses to speculation in the stock market and caused excessive fluctuations in stock prices. But the preponderance of academic evidence is that margin lending does not divert credit from productive uses and its regulation is not an effective tool for preventing stock market volatility. To prevent the excessive use of credit to purchase or trade securities, Section 7 of the Securities and Exchange Act of 1934 authorized the Federal Reserve System to regulate such loans.[77] Pursuant to that authority, the Federal Reserve has promulgated Regulations T, U, and X, which set the minimum amount of margin that customers must initially post when engaging in securities transactions on credit.[78] Regulation T applies to margin loans made by broker-dealers, Regulation U applies to margin loans made by banks and other lenders, and Regulation X applies to margin loans obtained by U.S. persons and certain related persons who obtain securities credit outside the United States to purchase U.S. securities, whose transactions are not explicitly covered by the other two regulations.[79] In effect, these regulations limit the extent to which customers can increase their leverage by using debt to finance their securities positions.

The Federal Reserve has raised and lowered the initial margin requirements for equity securities many times since enactment of the Securities Exchange Act of 1934. The highest margin requirement was 100 percent, adopted for about a year after the end of World War II. The lowest margin requirement was 40 percent and was in effect during the late 1930s and early 1940s. Otherwise, the initial margin requirement for equity securities has varied between 50 and 75 percent. The Federal Reserve has left the initial margin requirement at 50 percent since 1974.[80]

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[77] Ch. 404, § 7, 48 Stat. 881 (June 6, 1934) *codified at* 15 U.S.C. § 78g.

[78] Margin rules also have been established by U.S. securities self-regulatory organizations, such as NYSE Rule 431 and NASD Rule 2520, which limit the extension of credit by member broker-dealers. While FINRA is establishing new FINRA rules, the old rules continue to be effective until replaced by an applicable new FINRA rule.

[79] Regulation X, 12 C.F.R pt. 224, generally applies to U.S. citizens borrowing from non-U.S. lenders. Regulation X extends to borrowers the provisions of Regulations T and U for the purpose of purchasing or carrying securities. In that regard, our discussion focuses on Regulations T and U, 12 C.F.R. pts. 220 and 221.

Federal Reserve, OCC, and SEC staff told us that credit extended under Regulation T and U generally did not play a significant role in the buildup of leverage before the current crisis. According to Federal Reserve staff, Regulation T and U cover only one of many sources of credit and market participants have many ways to obtain leverage not covered by the regulations. For example, the credit markets are international, and market participants can obtain credit overseas where Regulation T and U do not apply. Similarly, OCC staff said that the margin regulations largely have been made obsolete by market developments. Under Regulation T and U, margins are set at 50 percent for the initial purchase of equities, but large investors can obtain greater leverage using non-equity securities (such as government securities) as collateral and various types of derivatives.[81] Finally, SEC staff told us that hedge funds and other investors do not widely use equities for margin and, in turn, leverage purposes because of Regulation T's restrictions. The staff said that hedge funds and other market participants can use other financial instruments to increase their leverage, such as exchange-traded futures contracts. As shown in figure 7, the total margin debt (dollar value of securities purchased on margin) consistently increased from year-end 2002 to year-end 2007, but the amount of margin debt as a percentage of the total capitalization of NYSE and NASDAQ stock markets was less than 2 percent.[82]

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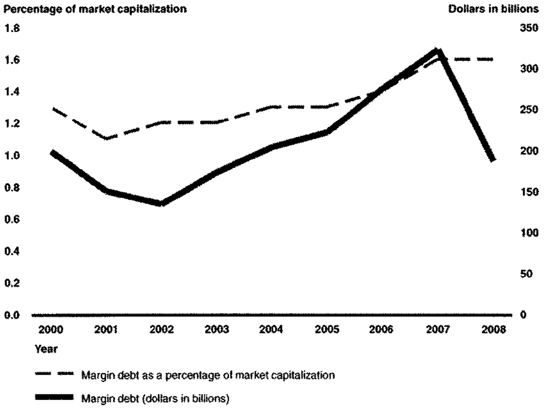
[80] Although section 7 of the Securities Exchange Act gives the Federal Reserve the authority to adopt initial and maintenance margins, the Federal Reserve has chosen to adopt only initial margin requirements. Broker-dealers, however, are required to join the Financial Industry Regulatory Authority and are therefore subject to its maintenance margin requirements. See New York Stock Exchange Rule 431 and National Association of Securities Dealers Rule 2520.

[81] Under regulation T, broker-dealers may accept exempted and margin securities as collateral for loans used to purchase securities. Exempted securities include government and municipal securities. Margin securities comprise a broad range of equity and non-equity, or debt, securities. The Federal Reserve has set the initial margin requirement for equity securities at 50 percent of their market value. In contrast, non-equity securities (e.g., corporate bonds, mortgage-related securities, and repurchase agreements on non-equity securities) and exempt securities are subject to a "good faith" margin requirement. Good faith margin means that a broker-dealer may extend credit on a particular security in any amount consistent with sound credit judgment.

Figure 7: Margin Debt and Margin Debt as a Percentage of the Total Capitalization of the NYSE and NASDAQ Stock Markets, 2000 through 2008



Source: GAO analysis of NYSE's margin debt data and the World Federation of Exchanges' market capitalization data.

Note: Margin debt as a percentage of the total stock market capitalization is overstated in the figure because the margin debt data include equity and non-equity securities but the market capitalization data include only equity securities.

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[82] Even though the total amount of margin debt decreased significantly from December 2007 to December 2008, the total margin debt as a percentage of total market capitalization did not decline, because the total market capitalization also declined significantly during this period.

Regulators Are Considering Reforms to Address Limitations the Crisis Revealed in Regulatory Framework for Restricting Leverage, but Have Not Reevaluated Basel II Implementation

The financial crisis has revealed limitations in existing regulatory approaches that restrict leverage, and although regulators have proposed changes to improve the risk coverage of the regulatory capital framework, limit cyclical leverage trends and better address sources of systemic risk, they have not yet formally reevaluated U.S. Basel II implementation in considering needed reforms. First, regulatory capital measures did not always fully capture certain risks, particularly those associated with some mortgage-related securities held on and off balance sheets. As a result, a number of financial institutions did not hold capital commensurate with their risks and some lacked adequate capital or liquidity to withstand the crisis. Federal financial regulators are considering reforms to better align capital requirements with risk, but have not formally assessed the extent to which these reforms may address risk-evaluation concerns the crisis highlighted with respect to Basel II approaches. Such an assessment is critical to ensure that Basel II changes that would increase reliance on complex risk models and banks' own risk estimates do not exacerbate regulatory limitations revealed by the crisis. Second, the crisis illustrated how the existing regulatory framework might have contributed to cyclical leverage trends that potentially exacerbated the current crisis. For example, according to regulators, minimum regulatory capital requirements may not provide adequate incentives for banks to build loss-absorbing capital buffers in benign markets when it would be less expensive to do so. Finally, the financial crisis has illustrated the potential for financial market disruptions, not just firm failures, to be a source of systemic risk. With multiple regulators primarily responsible for individual markets or institutions, none of the financial regulators has clear responsibility to assess the potential effects of the buildup of systemwide leverage or the collective activities of the industry for the financial system. As a result, regulators may be limited in their ability to prevent or mitigate future financial crises.

Regulatory Capital Measures Did Not Fully Capture Certain Risks

While a key goal of the regulatory capital framework is to align capital requirements with risks, the financial crisis revealed that a number of large financial institutions did not hold capital commensurate with the full range of risks they faced. U.S. federal financial regulators and market observers have noted that the accuracy of risk-based regulatory capital measures depends on proper evaluation of firms' on and off-balance sheet risk exposures. However, according to regulators, before the crisis many large financial institutions and their regulators underestimated the actual and contingent risks associated with certain risk exposures. As a result, capital regulations permitted institutions to hold insufficient capital against those exposures, some of which became sources of large losses or liquidity pressures as market conditions deteriorated in 2007 and 2008. When severe stresses appeared, many large banks did not have sufficient capital to absorb losses and faced pressures to deleverage suddenly and in ways that collectively may have exacerbated market stresses.

Credit Risks

The limited risk-sensitivity of the Basel I framework allowed U.S. banks to increase certain credit risk exposures without making commensurate increases in their capital requirements.[83] Under the Basel I framework, banks apply one of five risk-weightings in calculating their risk-based capital requirements for loans, securities, certain off-balance sheet exposures, and other assets held in their banking books.[84] Because Basel I does not recognize differences in credit quality among assets in the same risk-weighted category, some banks may have faced incentives to take on high-risk, low-quality assets within each broad risk category.

U.S. regulators have noted that the risks associated with a variety of loan types increased in the years before the crisis due to a number of factors, including declining underwriting standards and weakening market discipline. For example, subprime and Alt-A mortgages originated in recent years have exhibited progressively higher rates of delinquency (see fig. 8). However, as the risks of these loans increased, capital requirements did not increase accordingly. For example, under Basel I risk-weighting, a riskier loan reflecting declining underwriting standards could have received the same 50 percent risk-weighting as a higher quality mortgage loan. In particular, before the crisis, alternative mortgage products, such as interest-only and payment-option adjustable-rate mortgages, represented a growing share of mortgage originations as home prices increased nationally between 2003 and 2005.[85] Although mortgage statistics for these products reflected declining underwriting standards, Basel I rules did not require banks to hold additional capital for these loans relative to lower-risk, traditional mortgage loans in the same risk-weighting category. Larger-than-expected losses on loan portfolios depleted the regulatory capital of some large financial institutions, including two large thrift holding companies that ultimately failed. Through efforts to move certain large banks to the Basel II framework, U.S. federal financial regulators have sought to improve the risk-sensitivity of the risk-based capital framework.[86] However, FDIC officials told us that they are concerned that the advanced approaches of Basel II could require substantially less capital than Basel I. (For more detailed information about the Basel II framework, see app. IV.)

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[83] With the exception of broker-dealer holding companies participating in the SEC's CSE program, U.S. banks operated under the Basel I regulatory capital framework prior to the crisis.

[84] Assets held in the banking book generally include assets that are not actively traded and intended to be held for longer periods than trading portfolio assets. See appendix III for information about how assets are assigned to risk-weighting categories under Basel I.

[85] Before the crisis, to purchase homes borrowers might not be able to afford with a conventional fixed-rate mortgage, an increasing number of borrowers turned to alternative mortgage products, which offer comparatively lower and more flexible monthly mortgage payments for an initial period. Interest-only and payment option adjustable rate mortgages allow borrowers to defer repayment of principal and possibly part of the interest for the first few years of the mortgage. For more about the risks associated with alternative mortgage products, see GAO, *Alternative Mortgage Products: Impact on Defaults Remains Unclear, but Disclosure of Risks to Borrowers Could Be Improved*, GAO-06-1021 (Washington, D.C.: Sept. 19, 2006).

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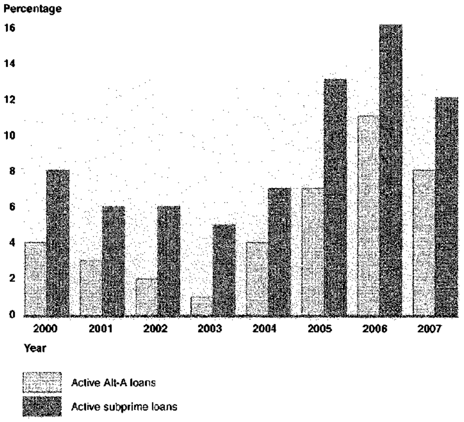
[86] For more about the U.S. efforts to transition large banks to the Basel II framework, see GAO, *Risk-Based Capital: Bank Regulators Need to Improve Transparency and Overcome Impediments to Finalizing the Proposed Basel II Framework*, GAO-07-253 (Washington, D.C.: Feb. 15, 2007).

Figure 8: Foreclosures by Year of Origination—Alt-A and Subprime Loans for the Period 2000 to 2007



Source: GAO analysis of LoanPerformance data.

Note: Analysis excludes investor loans.

Trading Book Risks

The financial crisis has highlighted limitations associated with the use of internal models by financial institutions to calculate capital requirements for their trading book assets.[87] Under the Market Risk Amendment adopted in 1996, banks with significant trading assets used internal risk models to determine how much capital to hold against the market risk of their trading book assets. Banks widely use Value-at-Risk (VaR) models to help measure their market risk.[88] The capital rules require the use of VaR models as well as an additional capital requirement for specific risk. According to a report published by the Financial Services Authority, banks generally attributed low risk to their trading book positions based on the use of their models before the crisis and, thus, were subjected to relatively low regulatory capital charges for their trading positions.[89] However, since the onset of the crisis, several large banks have suffered, among other losses on trading book assets, billions of dollars in writedowns on "super senior," or highly rated CDOs. According to some regulators, losses on these financial instruments have been significantly higher than minimum capital charges implied by the institutions' internal risk models. That is, the risk models underestimated the institutions' risk exposures to CDOs. For some leveraged institutions, the size of these CDO positions were small relative to total assets, but the writedowns constituted a significant portion of total capital and led to a significant erosion of the institutions' regulatory capital. As discussed earlier, all else equal, a small decline in assets will result in a larger percentage decrease in capital for a leveraged institution.

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[87] Trading book assets generally include securities that the bank holds in its trading portfolio and trades frequently. Trading book assets also can include securities that institutions intend to hold until maturity. For example, a security may be booked in the trading book because the derivative position used to hedge its return is in the trading book.

U.S. and international regulators have identified problems in the way that some financial institutions applied internal risk models to determine capital requirements and noted that the crisis has raised fundamental questions about the inherent limitations of such models and the assumptions and inputs employed by some users. For example, banks' VaR models often relied on recent historical observation periods, rather than observations during periods of financial stress. An institution's reliance on short-term data from a period of high liquidity and low market volatility generally would have suggested that certain trading book assets carried low risks and required little capital. According to one international regulator, in the years leading up to the crisis, VaR measures may have suggested declining risk when, in fact, risks associated with certain mortgage-related securities and other trading book positions—and capital needs—were growing. However, even if longer time periods had been used, VaR models may not have identified the scale of risks associated with certain exposures because VaR measures do not fully capture risks associated with low-probability, high-stress events. Moreover, as the crisis illustrated, VaR primarily measures the price volatility of assets but does not capture other risks associated with certain trading assets, including default risk. Although the Basel market risk framework directed institutions to hold capital against specific risks such as default risk, according to regulatory officials we spoke with, capital charges for specific risk did not adequately capture the default risk associated with certain exposures. Because of the inherent limitations of VaR models, financial institutions also are required to use stress tests to determine how much capital and liquidity might be needed to absorb losses in the event of a large shock to the system or a significant underestimation of the probability of large losses. According to the Basel Committee on Banking Supervision, institutions should test not only for events that could lower their profitability but also for rare but extreme scenarios that could threaten their solvency. However, according to regulatory officials, many firms did not test for sufficiently extreme scenarios, including scenarios that would render them insolvent.

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[88] VaR is a statistical measure of the potential loss in the fair value of a portfolio due to adverse movements in underlying risk factors. The measure is an estimate of the expected loss that an institution is unlikely to exceed in a given period with a particular degree of confidence. Specific risk means changes in the market value of specific positions due to factors other than broad market movements and includes such risks as the credit risk of an instrument's issuer.

[89] See the Financial Services Authority, *The Turner Review: A Regulatory Response to the Global Banking Crisis* (London: March 2009). The Financial Services Authority is the United Kingdom's financial regulator.

The crisis also revealed challenges with modeling the risks associated with relatively recent financial innovations. According to regulators, many market participants entered into new product lines without having sufficient data to properly measure the associated risks for determining capital needs. For example, the lack of historical performance data for CDOs presented challenges in estimating the potential value of these securities. In a March 2008 report, the Senior Supervisors Group—a body comprising senior financial supervisors from France, Germany, Switzerland, the United Kingdom, and the United States—reported that some financial institutions substituted price and other data associated with traditional corporate debt in their loss estimation models for similarly rated CDO debt, which did not have sufficient historical data.[90] Furthermore, CDOs may lack an active and liquid market, as in the recent market turmoil, forcing participants to look for other sources of valuation information when market prices are not readily available. For instance, market participants often turned to internal models and other methods to value these products, which raised concerns about the consistency and accuracy of the resulting valuation information.

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[90] See Senior Supervisors Group, *Observations on Risk Management Practices during the Recent Market Turbulence* (New York: Mar. 6, 2008).

Liquidity risks

In addition to capital required for credit and market risks, regulators direct financial institutions to consider whether additional capital should be held against risks that are not explicitly covered by minimum regulatory capital requirements.[91] Liquidity risk—the risk that a bank will be unable to meet its obligations when they come due, because of an inability to liquidate assets or obtain adequate funding—is one such risk. Prior to the crisis, most large financial institutions qualified as "well-capitalized," holding capital levels considered by regulators to exceed minimum requirements and provide some protection against risks such as liquidity risk. Regulators have noted that although strong capital positions can reduce the likelihood of liquidity pressures, capital alone is not a solution to inadequate liquidity. Many such "well-capitalized" institutions faced severe liquidity problems, underscoring the importance of liquidity risk management.

In particular, Bear Stearns, formerly a CSE, reported that it was in compliance with applicable rules with respect to capital and liquidity pools shortly before its failure, but SEC and Bear Stearns did not anticipate that certain sources of liquidity could rapidly disappear. According to SEC officials, Bear Stearns' failure was due to a run on liquidity, not capital. Shortly after Bear Stearns' failure, the then SEC Chairman noted that Bear Stearns failed in part when many lenders, concerned that the firm would suffer greater losses in the future, stopped providing funding to the firm, even on a fully-secured basis with high quality assets provided as collateral. SEC officials told us that neither they nor the broader regulatory community anticipated this development and that SEC had not directed CSEs to plan for the unavailability of secured funding in their contingent funding plans. SEC officials stated that no financial institution could survive without secured funding. Rumors about clients moving cash and security balances elsewhere and, more importantly, counterparties not transacting with Bear Stearns also placed strains on the firm's ability to obtain secured financing. Prior to these liquidity pressures, Bear Stearns reported that it held a pool of liquid assets well in excess of the SEC's required liquidity buffer, but this buffer quickly eroded as a growing number of lenders refused to rollover short-term funding. Bear Stearns faced the prospect of bankruptcy as it could not continue to meet its funding obligations. Although SEC officials have attributed Bear Stearns' failure to a liquidity crisis rather than capital inadequacy, these officials and market observers also stated that concerns about the strength of Bear Stearns' capital position—particularly given uncertainty about the potential for additional losses on its mortgage-backed securities—may have contributed to a crisis of confidence among its lenders, counterparties, and customers.

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[91] Risk-based regulatory capital ratios measure credit risk, market risk, and (under Basel II) operational risk. Risks not measured under pillar I include liquidity risk, concentration risk, reputational risk, and strategic risk.

Before Bear Stearns' collapse in March 2008, the Senior Supervisors Group noted that many financial institutions underestimated their vulnerability to the prolonged disruption in market liquidity that began in the summer of 2007. In a March 2008 report, the group noted that many firms were forced to fund exposures that had not been anticipated in their contingency funding plans. Notably, the sudden sharp drop-off in demand for securitizations forced some firms to retain loans that they had "warehoused" to package as securitized products, intending to transfer their credit risk to another entity. As a result, many banks retained credit exposure to certain assets over a far longer time horizon than expected, increasing the risk that they would suffer losses on these assets. In a strained funding environment, many banks also had to provide larger amounts of funding than expected against certain unfunded lending commitments made prior to the crisis.

Off-Balance Sheet Risks

The financial crisis also has raised concerns about the management of and capital treatment for risks associated with certain off-balance sheet assets, including contingent liquidity and reputation risks. Many large financial institutions created SPEs to buy and hold mortgage-related securities and other assets that were previously on their balance sheets. For example, after new capital requirements were adopted in the late 1980s, some large banks began creating SPEs to hold assets against which they would have been required to hold more capital if the assets had been held in their institutions. SPEs also are known as off-balance sheet entities, because they generally are structured in such a way that their assets and liabilities are not required to be consolidated and reported as part of the overall balance sheet of the financial institution that created them. According to federal banking regulators, when a bank committed to provide contingent funding support to an SPE, it generally would have been required to hold a small amount of capital against such a commitment.[92] For some types of SPEs, such as structured investment vehicles, banks provided no such contingent commitments and were subject to no capital charge. Nevertheless, some institutions retained significant reputation risk associated with their structured investment vehicles, even if they were under no legal obligation to provide financial support.[93]

The market turmoil in 2007 revealed that many institutions and regulators underestimated the contingent liquidity risks and reputation risks associated with their SPEs.[94] In a 2008 report, the Senior Supervisors Group noted that some firms failed to price properly the risk that exposures to certain off-balance sheet vehicles might need to be funded on the balance sheet precisely when it became difficult or expensive to raise such funds externally. Some off-balance sheet entities were structured in a way that left them vulnerable to market disruptions. For example, some SPEs held long-term assets (for example, financial institution debt and CDOs) financed with short-term liabilities (such as commercial paper), exposing them to the risk that they would find it difficult or costly to renew their debt financing under less-favorable market conditions.

When the turmoil in the markets began in 2007, some banks had to finance the assets held by their SPEs when those SPEs were unable to refinance their expiring debt due to market concerns over the quality of the assets. In some cases, SPEs relied on financing commitments that banks had extended to them. In other cases, financial institutions supported troubled SPEs to protect their reputations with clients even when no legal requirement to do so existed. Some large banks brought SPE assets onto their balance sheets where they became subject to capital requirements (see fig. 9). According to an official at the Federal Reserve, one large institution's decision to bring its structured investment vehicle assets onto the balance sheet did not have a significant, immediate impact on its capital ratio. Nevertheless, taking SPE assets onto their balance sheets required banks to hold capital against risk exposures that they previously had sought to transfer outside their institutions.

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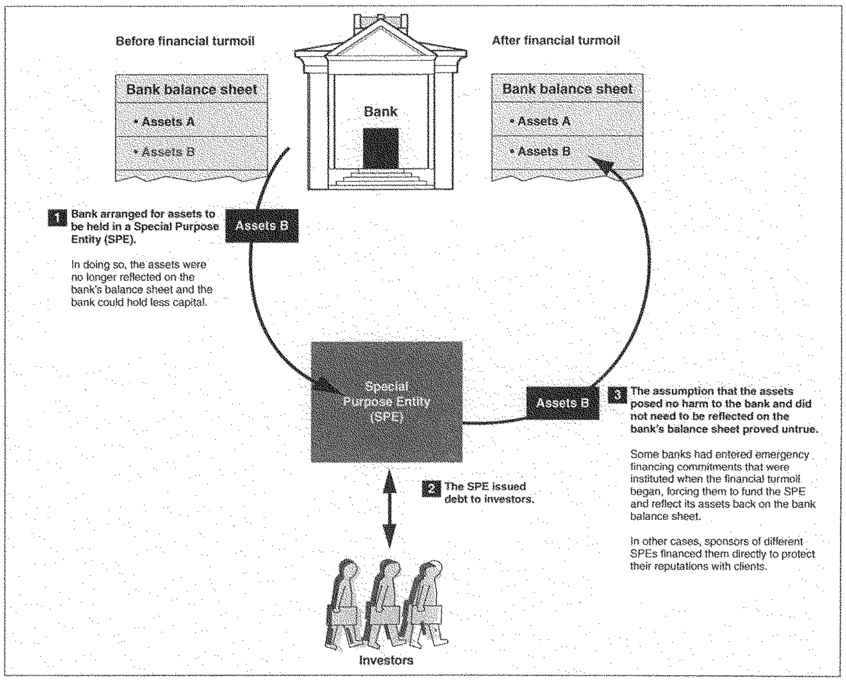
[92] Contingent funding support includes liquidity facilities and credit enhancements. Liquidity facilities are the assurance of a loan or guarantee of financial support to back up an off-balance sheet entity. Credit enhancements are defined as a contractual arrangement in which a bank retains or assumes a securitization exposure and, in substance, provides some degree of added protection to the parties to the transaction.

[93] Reputation risk is the potential for financial loss associated with negative publicity regarding an institution's business practices and subsequent decline in customers, costly litigation, or revenue reductions.

[94] Contingent liquidity risk refers to the risk that a bank would have to satisfy contractual or non-contractual obligations contingent upon certain events taking place.

Figure 9: Example of an Off-Balance Sheet Entity



1 Bank arranged for assets to be held in a Special Purpose Entity (SPE).

In doing so, the assets were no longer reflected on the bank's balance sheet and the bank could hold less capital.

2 The SPE issued debt to investors.

3 The assumption that the assets posed no harm to the bank and did not need to be reflected on the bank's balance sheet proved untrue.

Some banks had entered emergency financing commitments that were instituted when the financial turmoil began, forcing them to fund the SPE and reflect its assets back on the bank balance sheet.

In other cases, sponsors of different SPEs financed them directly to protect their reputations with clients.

Source: GAO.

Market Developments Have Challenged the Regulatory System's Ability to Oversee the Capital Adequacy of Financial Institutions

While regulators have the authority to require banks to hold capital in excess of minimum capital requirements, the crisis highlighted challenges they face in identifying and responding to capital adequacy problems before market stresses appear.[95] In prior work on the financial regulatory structure, we have noted that the current U.S. financial regulatory system has relied on a fragmented and complex arrangement of federal and state regulators that has not kept pace with the major developments that have occurred in financial markets and products in recent decades (see fig. 10).[96] The current system was not designed to adequately oversee today's large and interconnected financial institutions, the activities of which pose new risks to the institutions themselves as well as the risk that an event could affect the broader financial system (systemic risk). In addition, the increasingly critical role played by less-regulated entities, such as hedge funds, has further hindered the effectiveness of the financial regulatory system. Although many hedge fund advisors are now subject to some SEC oversight, some financial regulators and market participants remain concerned that hedge funds' activities can create systemic risk by threatening the soundness of other regulated entities and asset markets.

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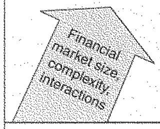
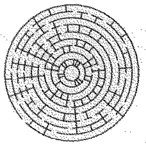
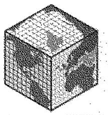
[95] 12 U.S.C. §1831o(c)(1)(B)(i).

[96] See GAO-09-216.

Figure 10: Key Developments and Resulting Challenges That Have Hindered the Effectiveness of the Financial Regulatory System

Developments in financial markets and products	Examples of how developments have challenged the regulatory system
 Financial market size, complexity, interactions **Emergence of large, complex, globally active, interconnected financial conglomerates**	Regulators sometimes lack sufficient authority, tools, or capabilities to oversee and mitigate risks.
	Identifying, preventing, mitigating, and resolving systemic crises has become more difficult.
 Less-regulated entities have come to play increasingly critical roles in financial system	Nonbank lenders and a new private-label securitization market played significant roles in subprime mortgage crisis that led to broader market turmoil.
	Activities of hedge funds have posed systemic risks.
	Overreliance on credit ratings of mortgage-backed products contributed to the recent turmoil in financial markets.
	Financial institutions' use of off-balance sheet entities led to ineffective risk disclosure and exacerbated recent market instability.
 **New and complex products that pose challenges to financial stability and investor and consumer understanding of risks.**	Complex structured finance products have made it difficult for institutions and their regulators to manage associated risks.
	Growth in complex and less-regulated over-the-counter derivatives markets have created systemic risks and revealed market infrastructure weaknesses.
	Investors have faced difficulty understanding complex investment products, either because they failed to seek out necessary information or were misled by improper sales practices.
	Consumers have faced difficulty understanding mortgages and credit cards with new and increasingly complicated features, due in part to limitations in consumer disclosures and financial literacy efforts.
	Accounting and auditing entities have faced challenges in trying to ensure that accounting and financial reporting requirements appropriately meet the needs of investors and other financial market participants.
 **Financial markets have become increasingly global in nature, and regulators have had to coordinate their efforts internationally.**	Standard setters and regulators also face new challenges in dealing with global convergence of accounting and auditing standards.
	Fragmented U.S. regulatory structure has complicated some efforts to coordinate internationally with other regulators, such as negotiations on Basel II and certain insurance matters.

Sources: GAO (analysis); Art Explosion (images).

In prior work on regulatory oversight of risk management at selected large institutions, we found that oversight of institutions' risk-management systems before the crisis illustrated some limitations of the current regulatory system.[97] For example, regulators were not looking across groups of institutions to effectively identify risks to overall financial stability. In addition, primary, functional, and holding company regulators faced challenges aggregating certain risk exposures within large, complex financial institutions. According to one regulatory official, regulators faced difficulties understanding one large banks' subprime-related exposures, in part because these exposures were held in both the national bank and broker-dealer subsidiaries, each of which was overseen by a different primary or functional regulator. We found that regulators identified weaknesses in risk-management systems at the selected large, complex institutions before the crisis, but did not fully recognize the threats they posed and did not take forceful actions to address them until the crisis began.

Regulators Have Proposed Revisions to the Regulatory Capital Framework, but Have Not Yet Reevaluated Basel II Implementation in Light of Risk-Evaluation Concerns

Since the crisis began, U.S. federal financial regulators have worked together and with international regulators, such as through the Group of Twenty and the Basel Committee on Banking Supervision, in considering reforms that could increase the risk coverage of the regulatory capital framework.[98] U.S. and international regulators have proposed revisions to the Basel market risk framework to better ensure that institutions hold adequate levels of capital against trading book exposures.[99] Proposed revisions include applying higher capital requirements to resecuritizations such as CDOs and applying the same capital treatment to these securitizations whether on the bank's trading or banking book.[100] Regulators also have suggested raising the capital requirements that apply to certain off-balance sheet commitments. In June 2009, the Financial Accounting Standards Board published new accounting standards related to off-balance sheet entities, including a new rule that will require financial institutions to consolidate assets from certain SPEs.[101] In addition, regulators have issued recommendations related to improving risk management at institutions, including strengthening supervision of their VaR models and stress testing. As many institutions failed to anticipate the impact that liquidity pressures could have on their regulatory capital, regulators also have recommended ways to improve coordination of capital and liquidity planning. The current crisis demonstrated that risks such as liquidity and asset quality risks were increasing at institutions long before firms experienced losses that eroded capital. However, because capital can be a lagging indicator of problems that may threaten a firm's solvency, regulators have recommended that they and other market participants assess a broader range of risk indicators when assessing capital adequacy.

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[97] GAO, *Financial Regulation: Review of Regulators' Oversight of Risk Management Systems at a Limited Number of Large, Complex Financial Institutions*, GAO-09-499T (Washington, D.C.: Mar. 18, 2009).

[98] In April 2009, the Group of Twenty, which represents the world's leading and largest emerging economies, met in London to discuss the international response to the global financial crisis.

[99] In January 2009, the Basel Committee on Banking Supervision proposed revisions to the Basel II market risk framework.

[100] The Basel Committee on Banking Supervision has defined a resecuritization exposure as a securitization exposure where one or more of the underlying exposures is a securitization exposure.

Although federal financial regulators have taken a number of steps to strengthen supervision of capital adequacy since the crisis began, they have not yet implemented proposals to increase the risk coverage of regulatory capital requirements. Among other actions, SEC staff are reviewing the liquidity of assets held by broker-dealers and considering whether capital charges for less liquid positions are appropriate, and the Federal Reserve has conducted stress tests to assess the capital adequacy of 19 banks under the Supervisory Capital Assessment Program and required 10 of the banks to raise capital to be better prepared to withstand a more adverse economic scenario. Federal financial regulators are continuing to work with international regulators in forums such as the Basel Committee on Banking Supervision, but have not formally revised capital requirements to address limitations revealed by the crisis or fully evaluated how some proposals would be implemented. For example, U.S. and international regulators have acknowledged the need to provide greater weight in determining capital adequacy to low-probability, high-loss events and are continuing to develop reforms to accomplish this goal. In its financial regulatory reform proposal released in June 2009, Treasury announced its intention to lead a working group of regulators and outside experts in conducting a reassessment of the existing regulatory capital framework for banks and bank holding companies and expressed support for the Basel Committee's ongoing efforts to reform the Basel II framework.[102]

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[101] Statement 166 eliminates the exemption from consolidation for certain SPEs. A second new standard, Statement 167, requires ongoing reassessments of whether consolidation is appropriate for assets held by certain off-balance sheet entities. These new standards will impact financial institution balance sheets beginning in 2010.

Nonrisk-based Capital Requirements

In light of the risk-evaluation challenges revealed by the crisis, U.S. and international financial regulators and market observers have commented on the potential benefits of supplementing risk-based capital measures with a nonrisk-based capital requirement. While U.S. banks and bank holding companies were and continue to be subject to a minimum leverage ratio (Tier 1 Capital/Total Assets) and risk-based capital requirements, international banks based in industrialized countries generally were not subject to a minimum leverage requirement before and during the crisis. U.S. and international regulators have noted that the minimum leverage requirement can serve as an important backstop in the event that financial institutions quantify risks incorrectly, as many appear to have done in the years prior to the crisis. Moreover, the leverage ratio is easy to calculate and can be considered to cover areas that risk-based requirements do not currently address, such as interest rate risk and concentration risk. By limiting the total size of a firm's assets regardless of their associated risks, a minimum leverage requirement may serve to restrict the aggregate size of positions that might need to be simultaneously unwound during a crisis, thereby limiting the build-up of systemic risk. According to one regulatory official, subjecting institutions to both risk-based and minimum leverage requirements may reduce opportunities for regulatory arbitrage. However, the current crisis also illustrated limitations of the leverage ratio. For example, the U.S. leverage ratio requirement, as currently formulated, does not capture off-balance sheet exposures and, as a result, did not capture increasing risks associated with certain off-balance sheet vehicles. Furthermore, having a minimum leverage ratio in place did not safeguard against the failures and near-failures of some large financial institutions. Officials at some banks we spoke with noted that imposing a leverage ratio requirement conflicts with the purpose of moving to a conceptually more risk-sensitive capital allocation framework. Some bank officials expressed concern that the leverage ratio may, in some cases, provide disincentives for banks to hold low-risk assets on the balance sheet. However, according to the Federal Reserve, this disincentive does not present a regulatory capital problem from a prudential perspective so long as appropriate risk-based capital charges are levied against all assets and risk exposures that are retained by a bank. In a March 12, 2009, press release, the Basel Committee announced, among other things, its plan to improve the risk coverage of the capital framework and introduce a non-risk based supplementary measure.

In addition, the crisis highlighted some important concerns raised about the Basel II framework prior to the crisis, but federal financial regulators have not taken steps to formally reevaluate current U.S. plans to transition certain large financial institutions to Basel II. In our prior work on the U.S. Basel II transition, we noted that some regulators and market observers expressed concern about the ability of banks' models to adequately measure risks for regulatory capital purposes and the regulators' ability to oversee them. Although most U.S. banks have not yet implemented advanced risk-based approaches for credit risk, internal risk models applied by many U.S. firms before the crisis significantly underestimated risks and capital needs for trading book assets. Moreover, FDIC officials have indicated that capital requirements for most forms of credit risk under Basel II's advanced approaches will be substantially less than the Basel I requirements. Regulators already face resource constraints in hiring and retaining talent that are more binding than the resource constraints faced by the banks they regulate and this issue is likely to become more significant under Basel II. These resource constraints are a critical point because under Basel II regulators' judgment will likely play an increasingly important role in determining capital adequacy. In 2007, we recommended that regulators, at the end of the last transition period, reevaluate whether the advanced approaches of Basel II can and should be relied on to set appropriate capital requirements for the long term.[103] Federal financial regulators have proposed a study of banks' implementation of the advanced approaches after the second transitional year, but as a result of delays attributable in part to the financial crisis, it is unclear when this study will be completed. In 2008, we further recommended that regulators take steps jointly to plan for a study to determine if major changes need to be made to the advanced approaches or whether banks will be able to fully implement the current rule. We recommended that in their planning they consider, among other issues, the timing needs for the future evaluation of Basel II. Given the challenges regulators faced overseeing capital adequacy under Basel I, if regulators move forward with full implementation of Basel II before conducting such a reevaluation, changes to the regulatory capital framework may not address, and in some cases, possibly exacerbate limitations the crisis revealed in the regulatory framework. Federal Reserve officials with whom we spoke said that federal financial regulators are continuing to participate in international efforts to reevaluate the Basel II framework and expect the outcome of this work to influence U.S. Basel II implementation.

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[102] Department of the Treasury, *Financial Regulatory Reform: A New Foundation* (Washington, D.C.: June 2009).

[103] GAO-07-253.

Regulatory Capital Framework May Not Have Provided Adequate Incentives to Counteract Cyclical Leverage Trends and Regulators Are Considering Reforms to Limit Procyclicality

According to U.S. and international financial regulators, the tendency for leverage to move procyclically—increasing in strong markets and decreasing when market conditions deteriorate—can amplify business cycle fluctuations and exacerbate financial instability. As discussed earlier in this report, heightened systemwide leverage can increase the vulnerability of the financial system to a crisis, and when stresses appear, simultaneous efforts by institutions to deleverage may have adverse impacts on the markets and real economy. U.S. and international regulators, through forums such as the Financial Stability Forum and the Basel Committee on Banking Supervision, have expressed concern that the financial regulatory framework did not provide adequate incentives for firms to mitigate their procyclical use of leverage. For example, according to regulators, many financial institutions did not increase regulatory capital and other loss-absorbing buffers during the market upswing, when it would have been easier and less costly to do so.[104] Moreover, when the crisis began, rather than drawing down capital buffers in a controlled manner, these institutions faced regulatory requirements and market pressures to increase them. Although procyclicality may be inherent in banking to some extent, regulators have noted that elements of the regulatory framework may act as contributing factors.

Several interacting factors, including risk-measurement limitations, accounting rules, and market discipline can cause capital buffers to fall during a market expansion and rise during a contraction. With respect to risk-measurement limitations, the more procyclical the measurements of risk used to calculate regulatory capital requirements are, the more likely that these requirements will contribute to procyclical leverage trends. For example, U.S. and international regulators have noted that VaR measures of market risk tended to move procyclically before and during the crisis, particularly to the extent that banks relied on near-horizon estimates of quantitative inputs such as short-term volatility. In the years preceding the crisis, the internal risk models relying on such near-horizon estimates generally indicated that market risks were low, allowing banks to hold relatively small amounts of capital against trading book assets. Conversely, when measured risk spiked during the crisis, firms' models directed them to increase capital, when it was significantly more costly and difficult to do so. To the extent that risk measures are procyclical, the use of fair value accounting, which requires banks to periodically revalue trading book positions, also may contribute to procyclical leverage trends.[105] For example, when the fair value of super senior CDOs decreased suddenly, the associated writedowns taken in accordance with fair value accounting resulted in significant deductions to regulatory capital at some firms. Conversely, FDIC officials told us that attention should be given to whether regulatory rules motivated financial institutions to overvalue these illiquid instruments during the years leading up to the crisis. Finally, independent of regulatory requirements, market forces can influence the size of regulatory capital buffers through the market cycle. For example, banks consider the expectations of counterparties and credit rating agencies when deciding how much capital to hold.

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[104] Other regulatory loss-absorbing buffers include loan loss provisions and margin and collateral requirements. Provisions for loan losses allow banks to recognize income statement losses for expected loan portfolio losses before they occur. Current accounting rules require recognition of a loan loss provision only when a loan impairment event takes place or events occur that are likely to result in future non-payment of a loan. Some observers have commented that earlier provisioning for loan losses may help to reduce the magnitude of financial losses that hit the income statement and deplete regulatory capital when market conditions deteriorate. To address the potential contribution of these other buffers to procyclicality, domestic and international regulators have proposed changes in a Financial Stability Forum report: *Report of the Financial Stability Forum on Addressing Procyclicality in the Financial System* (Basel, Switzerland: April 2009).

U.S. and international financial regulators have acknowledged that limiting procyclical leverage trends is critical to improving the systemwide focus of the regulatory framework and have taken steps to assess possible reforms.[106] In addition to changes proposed to expand coverage of trading book risks, U.S. and international regulators have suggested revising the Basel market risk framework to reduce reliance on cyclical VaR-based capital estimates. For example, the Basel Committee has proposed requiring banks to calculate a stressed VaR (in addition to the existing VaR requirement) based on historical data from a period of financial distress relevant to the firm's portfolio. While most U.S. banks have not fully implemented Basel II approaches for modeling capital needs for credit risks, U.S. financial regulators noted before the crisis that elements of the U.S. implementation of Basel II, including use of through-the-cycle measures of risk and stress testing practices, would help to moderate the cyclicality of capital requirements.[107] However, federal financial regulators identified weaknesses with the stress testing practices of some large banks. In prior work, we recommended that federal financial regulators clarify the criteria that would be used for determining an appropriate average level of required capital and appropriate cyclical variation in minimum capital.[108] Although U.S. and international regulators have made progress in developing proposals to limit procyclical leverage trends, federal financial regulators have not formally incorporated such criteria into the regulatory framework.

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[105] The financial crisis has highlighted challenges associated with balancing the goals of providing sufficient financial disclosures for investors and maintaining financial stability. The Financial Accounting Standards Board recently revised fair value accounting rules to allow firms to distinguish between losses arising from the underlying creditworthiness of assets and losses arising from market conditions.

[106] See GAO-09-216. GAO included systemwide focus as one of nine elements in a proposed framework for evaluating financial regulatory reforms. Systemwide focus refers to having mechanisms to identify, monitor, and manage risks to the financial system regardless of the source of the risk or the institutions in which it is created.

Beyond limiting procyclicality arising from risk-measurement practices, U.S. and international regulators have acknowledged that additional measures may be needed to ensure that firms build adequate buffers during strong economic conditions and that they can draw down these buffers during periods of stress. Regulators have proposed implementing countercyclical buffers, such as through explicit adjustments to increase minimum capital requirements during a market expansion and reduce them in a contraction, but have acknowledged some challenges in designing and implementing such measures. For example, regulators would need to assess the appropriate balance of discretionary and non-discretionary measures in achieving adjustment of capital requirements throughout the cycle. One regulatory official told us that regulators face challenges identifying market troughs and, as a result, may find it difficult to adjust minimum capital requirements appropriately throughout the cycle. For example, uncertainty about the timing of an economic recovery may make it difficult in practice to reduce minimum capital requirements in a downturn. Furthermore, even if minimum regulatory capital requirements adjust appropriately, some procyclicality in buffers may be unavoidable as institutions respond to market expectations. As an example, an institution might face pressures from credit rating agencies and other market participants to reduce leverage as market strains appear, despite facing a lower minimum regulatory capital requirement. Finally, any such changes will need to incorporate ways to promote greater international consistency while reflecting differences in national economic cycles.

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[107] 72 Fed. Reg. 69288, 69393 (Dec. 7, 2007).

[108] GAO-07-253.

Financial Regulatory System Does Not Provide Sufficient Attention to Systemic Risk

In our prior work, we have noted that a regulatory system should focus on risk to the financial system, not just institutions.[109] The financial crisis has highlighted the potential for financial market disruptions, not just firm failures, to be a source of systemic risk. Ensuring the solvency of individual institutions may not be sufficient to protect the stability of the financial system, in part because deleveraging by institutions could have negative spillover effects. During economic weakness or market stress, an individual institution's efforts to protect its own safety and soundness (by reducing lending, selling assets, or raising collateral requirements) can cause stress for other market participants and contribute to a financial crisis. With multiple regulators primarily responsible for individual markets or institutions, none of the financial regulators is tasked with assessing the risks posed by the systemwide buildup of leverage and sudden deleveraging that may result from the collective activities of many institutions. Without a single entity responsible for assessing threats to the overall financial system, regulators may be limited in their ability to prevent or mitigate future crises.

U.S. regulators have recognized that regulators often focus on the financial condition of individual institutions and not on the financial stability of the financial system. In an August 2008 speech, the Federal Reserve Chairman stated that U.S. regulation and supervision focuses, at least informally, on some systemwide elements but outlined some more ambitious approaches to systemwide regulation.[110] Examples included (1) developing a more fully integrated overview of the entire financial system, partly because the system has become less-bank centered; and (2) conducting stress tests for a range of firms and markets, in part to provide insight into how a sharp change in asset prices might affect not only a particular institution but also impair liquidity in key markets. Regulators also have recommended that financial regulators monitor systemwide measures of leverage and measures of liquidity to enhance supervision of risks through the cycle. However, as the Federal Reserve Chairman has noted, the more comprehensive the regulatory approach, the more technically demanding and costly it would be for regulators and affected institutions.

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[109] GAO-09-216.

[110] Federal Reserve Chairman Ben S. Bernanke, Opening Remarks at Kansas City Federal Reserve's Bank 2008 Symposium on Maintaining Stability in a Changing Financial System (August 2008).

Finally, creating a new body or designating one or more existing regulators with the responsibility to oversee systemic risk could serve to address a significant gap in the current U.S. regulatory system. Various groups, such as the Department of the Treasury, the Group of Thirty, and the Congressional Oversight Panel have put forth proposals for addressing systemic risk. Our analysis of these proposals found that each generally addresses systemic risk issues similarly by calling for a specific organization to be tasked with the responsibility of overseeing systemic risk in the financial system, but not all provided detail on which entity should perform this role or how it would interact with other existing regulators (see table 1).

Table 1: Comparison of Various Regulatory Reform Proposals to Address Systemic Risk

Proposal	How proposal addresses systemic risk
Treasury Financial Regulatory Reform Proposal (2009)	• Calls for creation of a Financial Services Oversight Council (FSOC) to oversee systemic risk across institutions, products, and markets. FSOC would have eight members, including the Treasury Secretary and the Chairmen of the Federal Reserve, CFTC, FDIC, and SEC. FSOC would replace the President's Working Group on Financial Markets and have a permanent, full-time staff. • Calls for stricter and more conservative regulatory capital, liquidity, and risk management requirements for all financial firms that are found to pose a threat to the U.S. economy's financial stability based on their size, leverage, and interconnectedness. • FSOC would identify such financial firms as Tier 1 Financial Holding Companies and these firms all would be subject to consolidated supervision by the Federal Reserve.
FDIC Chairman	• Suggests creation of a systemic risk council (SRC) to oversee systemic risk across institutions, products, and markets. Treasury, FDIC, and the Federal Reserve, among others, would hold positions on SRC. • SRC would be responsible for setting capital and other standards designed to provide incentives to reduce or eliminate potential systemic risks. • SRC could have authority to overrule or force actions on behalf of other regulatory entities and would have authority to demand better information from systemically important entities.

Proposal	How proposal addresses systemic risk
Federal Reserve Chairman	• Calls for designation of an organization to oversee systemic risk across institutions, products, and markets. • Calls for strengthening regulatory standards for governance, risk management, capital, and liquidity. • Authority would look broadly at systemic risks, beyond the institution level to connections between institutions and other gaps in the current system.
SEC Chairman	• Calls for maintaining an independent capital markets regulator that focuses on investor protection and complements the role of any systemic risk regulator, in order to provide a more effective financial oversight regime. • Favors concept of a new "systemic risk council" comprised of the Treasury Department, Federal Reserve, FDIC, and SEC to monitor large institutions against financial threats and ensure sufficient capital levels and risk management. • Calls for bringing all OTC derivatives and hedge funds within a regulatory framework.
Group of Thirty	• Advocates consolidated supervision of all systemically important financial institutions. • Strengthens regulatory standards for risk management, capital, and liquidity. • Increases regulation and transparency of OTC derivatives markets.
Congressional Oversight Panel	• Calls for designation of an organization to oversee systemic risk across institutions, products, and markets. • Acknowledges the need for regulatory improvements regarding financial institution capital and liquidity. • Increases regulation and transparency of OTC derivatives markets.
Treasury Blueprint (2008)	• Designates an organization—the Federal Reserve—to have broad authority to oversee systemic risk across institutions, products, and markets. • Regulator would collect, analyze, and disclose information on systemically important issues and could examine institutions and generally take corrective actions to address problems. • Regulator could provide liquidity in systemic situations.

Source: GAO analysis of regulatory reform proposals.

For such an entity to be effective, it would likely need to have the independent ability to collect information, conduct examinations, and compel corrective actions across all institutions, products, and markets that could be a source of systemic risk. Such a regulator could assess the systemic risks that arise within and across financial institutions, within specific financial markets, across the nation, and globally. However, policymakers should consider that a potential disadvantage of providing an agency or agencies with such broad responsibility for overseeing financial entities could be that it may imply new or increased official government support or endorsement, such as a government guarantee, of such activities, and thus encourage greater risk taking by these financial institutions and investors. To address such concerns, some have proposed that entities designated as systemically important could correspondingly have increased requirements for capital adequacy or leverage limitations to offset the advantages that they may gain from implied government support. For example, in its recent proposal for financial regulatory reform, Treasury called for higher regulatory capital and other requirements for all financial firms found to pose a threat to financial stability based on their size, leverage, and interconnectedness to the financial system.

Conclusions

The causes of the current financial crisis remain subject to debate and additional research. Nevertheless, some researchers and regulators have suggested that the buildup of leverage before the financial crisis and subsequent disorderly deleveraging have compounded the current financial crisis. In particular, some studies suggested that the efforts taken by financial institutions to deleverage by selling financial assets could lead to a downward price spiral in times of market stress and exacerbate a financial crisis. However, alternative theories provide possible explanations; for example, the drop in asset prices may reflect prices reverting to more reasonable levels after a period of overvaluation or it may reflect uncertainty surrounding the true value of the assets. In addition, deleveraging by restricting new lending could slow economic growth and thereby contribute to a financial crisis.

The federal regulatory capital framework can serve an important role in restricting the buildup of leverage at individual institutions and across the financial system and thereby reduce the potential for a disorderly deleveraging process. However, the crisis has revealed limitations in the framework's ability to restrict leverage and to mitigate crises. Federal financial regulators have proposed a number of changes to improve the risk coverage of the regulatory capital framework, but they continue to face challenges in identifying and responding to capital adequacy problems before unexpected losses are incurred. These challenges will take on greater significance as regulators consider changes under Basel II that would increase reliance on complex risk models for determining capital needs, placing even greater demands on regulators' judgment in assessing capital adequacy. Although advanced modeling approaches offer the potential to align capital requirements more closely with risks, the crisis has underscored the potential for uncritical application of these models to miss or understate significant risks, especially when underlying data are limited. Indeed, concerns that advanced approaches could result in unsafe reductions in risk-based capital requirements influenced decisions by U.S. regulators to retain the leverage ratio requirement and to slowly phase in Basel II over several years. In prior work on the U.S. transition to Basel II for certain large financial institutions, we recommended that regulators, at the end of the last transition period, reevaluate whether the advanced approaches of Basel II can and should be relied on to set appropriate regulatory capital requirements in the long term. U.S. regulators plan to conduct an evaluation of the advanced approaches at the end of the second transitional year, but the timing of the completion of this study is uncertain. Without a timely reevaluation, regulators may not have the information needed to ensure that reforms to the regulatory capital framework adequately address the lessons learned from the crisis.

A principal lesson of the crisis is that an approach to supervision that focuses narrowly on individual institutions can miss broader problems that are accumulating in the financial system. In that regard, regulators need to focus on systemwide risks to and weaknesses in the financial system—not just on individual institutions. Although federal regulators have taken steps to focus on systemwide issues, no regulator has clear responsibility for monitoring and assessing the potential effects of a buildup in leverage in the financial system or a sudden deleveraging when financial market conditions deteriorate. However, leverage has been a source of problems in past financial market crises, such as the 1998 market disruptions involving Long-Term Capital Management. After that crisis, regulators recognized not only the need for better measures of leverage but also the difficulties in measuring leverage. Given the potential role leverage played in the current crisis, regulators clearly need to identify ways in which to measure and monitor systemwide leverage to determine whether their existing framework is adequately limiting the use of leverage and resulting in unacceptably high levels of systemic risk. In addition, research and experience have helped to provide insights on market, regulatory, and other factors that can reinforce the tendency for leverage to move procyclically and amplify business cycle fluctuations and exacerbate financial instability. Although regulators are taking action to address elements of the regulatory framework that may act as contributing factors, each regulator's authority to address the issue is limited to the institutions it supervises. To that end, without a systemwide focus, regulators may be limited in their ability to prevent or mitigate future crises.

Matter for Congressional Consideration

As Congress considers assigning a single regulator, a group of regulators, or a newly created entity with responsibility for overseeing systemically important firms, products, or activities to enhance the systemwide focus of the financial regulatory system, Congress may wish to consider the merits of tasking this systemic regulator with:

- identifying ways to measure and monitor systemwide leverage and
- evaluating options to limit procyclical leverage trends.

Recommendation for Executive Action

The current financial crisis has shown that risk models, as applied by many financial institutions and overseen by their regulators, could significantly underestimate the capital needed to absorb potential losses. Given that the Basel II approach would increase reliance on complex risk models for determining a financial institution's capital needs and place greater demands on regulators' judgment in assessing capital adequacy, we recommend that the heads of the Federal Reserve, FDIC, OCC, and OTS apply lessons learned from the current crisis and assess the extent to which Basel II reforms proposed by U.S. and international regulators may address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches. As part of this assessment, the regulators should determine whether consideration of more fundamental changes under a new Basel regime is warranted.

Agency Comments and Our Evaluation

We provided the heads of the Federal Reserve, FDIC, OCC, OTS, SEC, and Treasury with a draft of this report for their review and comment. We received written comments from the Federal Reserve, FDIC, OCC, and SEC. These comments are summarized below and reprinted in appendixes V through VIII. We did not receive written comments from OTS and Treasury. Except for Treasury, the agencies also provided technical comments that we incorporated in the report where appropriate.

The Federal Reserve commented that high levels of leverage throughout the global financial system contributed significantly to the current financial crisis. It agreed that the recent crisis has uncovered opportunities to improve the risk sensitivity of the Basel I- and Basel II-based risk-based capital standards and noted that its staff is involved in current international efforts to strengthen minimum capital requirements. The Federal Reserve concurred with our recommendation for a more fundamental review of the Basel II capital framework, including risk evaluation and regulatory oversight concerns associated with the advanced approaches.

FDIC commented that the excessive use of leverage during the buildup to the crisis made individual firms and the financial system more vulnerable to shocks and reduced the regulators' ability to intervene before problems cascaded. FDIC also agreed with our recommendation and noted that it, along with other U.S. banking agencies, is working with the Basel Committee to develop proposals to address regulatory concerns discussed in our report. To the extent such proposals do not address the concerns, FDIC noted that it will consider the matter as part of the interagency review of Basel II that the agencies committed by regulation to undertake and will propose suitable remedies, if needed.

OCC agreed that recent events have highlighted certain weaknesses in its regulatory capital framework (both Basel I-based and Basel II) and noted that it is in the process of making modifications to address such weaknesses. It commented that Basel II lays a strong foundation for addressing supervisory challenges and remains committed to scrutinizing and improving the framework. With respect to our recommendation, OCC reiterated that it, along with the other banking agencies, will develop more formal plans to study the implementation of Basel II after a firmer picture of banks' implementation progress develops.

Finally, SEC staff commented that our recommendation is a valuable contribution and will take it into consideration in its recommendations to the SEC Commission. The staff also commented that SEC rules, including the broker-dealer net capital rule, largely conform to our conclusion that regulators need to identify ways in which to monitor and measure systemwide leverage to determine whether their existing framework is adequately limiting the use of leverage. Finally, the staff noted that SEC, along with other financial regulators, should build on and strengthen approaches that have worked, while taking lessons from what has not worked in order to be better prepared for future crises.

We are sending copies of this report to the Congressional Oversight Panel and interested congressional parties, the Chairman of the Board of Governors of the Federal Reserve System, the Chairman of FDIC, the Comptroller of the Currency, the Director of OTS, the Chairman of SEC, and the Secretary of the Treasury. In addition, the report will be available at no charge on GAO's Web site at http://www.gao.gov.

If you or your staff have any questions regarding this report, please contact me at (202) 512-5837 or williamso@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix X.

Orice Williams Brown

Orice Williams Brown
Director, Financial Markets
and Community Investment

List of Congressional Committees

The Honorable Christopher J. Dodd
Chairman
The Honorable Richard C. Shelby
Ranking Member
Committee on Banking, Housing, and Urban Affairs
United States Senate

The Honorable Barney Frank
Chairman
The Honorable Spencer Bachus
Ranking Member
Committee on Financial Services
House of Representatives

Appendix I: Scope and Methodology

To assess the way in which the leveraging and deleveraging by financial institutions has contributed to the current financial crisis, we reviewed and summarized academic and other studies that included analysis of deleveraging as a potential mechanism for propagating a market disruption. Based on our searches of research databases (EconLit, Google Scholar, and the Social Science Research Network), we identified 15 studies, which included published and working papers that were released between 2008 and 2009. (See the bibliography for the studies included in our literature review.) Given our mandate, our literature search and review focused narrowly on deleveraging by financial institutions, although other economic mechanisms might have played a role in propagating the disruptions in the subprime mortgage markets to other financial markets. Based on our selection criteria, we determined that the 15 studies were sufficient for our purposes. Nonetheless, these studies do not provide definitive findings about the role of deleveraging relative to other mechanisms, and we relied on our interpretation and reasoning to develop insights from the studies reviewed. To obtain information on the ways that financial institutions increased their leverage before the crisis and deleveraged during the crisis and effects such activities had, we interviewed officials from two securities firms that used to participate in SEC's now defunct Consolidated Supervised Entity Program (CSE), a large bank, and a credit rating agency. We also interviewed staff from the Board of Governors of the Federal Reserve System (Federal Reserve), Federal Reserve Bank of New York, Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), Office of Thrift Supervision (OTC), and Securities and Exchange Commission (SEC) for the same purposes.

To describe regulations that federal financial regulators have adopted to try to limit the use of leverage by financial institutions and federal oversight of the institutions' compliance with the regulations, we reviewed and analyzed relevant laws and regulations, and other regulatory guidance and materials, related to the federal oversight of the use of leverage by financial institutions. For example, we reviewed examination manuals and capital adequacy guidelines for banks and bank holding companies used by their respective federal bank regulators. In addition, we reviewed SEC's net capital guidelines for broker-dealers. We also reviewed the extensive body of work that GAO has completed on the regulation of banks, securities firms, hedge funds, and other financial institutions. In addition, we interviewed staff from the Federal Reserve, FDIC, OCC, OTS, and SEC about the primary regulations their agencies have adopted to limit the use of leverage by their regulated financial institutions and their regulatory framework for overseeing the capital adequacy of their institutions. To obtain more detailed information, we interviewed Federal Reserve Bank of New York and OCC examiners responsible for supervising a bank holding company and two national banks, respectively. We also interviewed officials from two securities firms and one bank to obtain information on the effect federal regulations had on their use of leverage. Finally, to gain insights on the extent to which federal financial regulators used their regulatory tools to limit the use of leverage, we also reviewed testimonies provided by officials of federal financial regulatory agencies as well as reports by the offices of inspector general at the Department of the Treasury and SEC.

To identify and analyze limitations in the regulatory framework used to restrict leverage and changes that regulators and others have proposed to address such limitations, we reviewed and analyzed relevant reports, studies, and public statements issued by U.S. and international financial regulators. Specifically, to identify potential limitations in the regulatory capital framework, we reviewed analyses and recommendations published by regulators through working groups such as the President's Working Group on Financial Markets,[1] the Basel Committee on Banking Supervision,[2] the Financial Stability Forum,[3] and the Senior Supervisors'

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[1] The President's Working Group on Financial Markets was established by Executive Order No. 12631, 53 Fed. Reg. 9421 (Mar. 18, 1988). The Secretary of the Treasury chairs the group, the other members of which are the chairpersons of the Federal Reserve, SEC, and Commodity Futures Trading Commission. The group was formed to enhance the integrity, efficiency, orderliness, and competitiveness of the U.S. financial markets and maintain investor confidence in those markets.

[2] The Basel Committee on Banking Supervision (Basel Committee) seeks to improve the quality of banking supervision worldwide, in part by developing broad supervisory standards. The Basel Committee consists of central bank and regulatory officials from Argentina, Australia, Belgium, Brazil, Canada, China, France, Germany, Hong Kong SAR, India, Indonesia, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. The Basel Committee's supervisory standards are also often adopted by nonmember countries.

[3] The Financial Stability Forum comprises national financial authorities (central banks, supervisory authorities, and finance ministries) from the G7 countries, Australia, Hong Kong, Netherlands, Singapore, and Switzerland, as well as international financial institutions, international regulatory and supervisory groupings, committees of central bank experts and the European Central Bank. In April 2009, the Financial Stability Forum was re-established as the Financial Stability Board, with a broadened mandate to promote financial stability.

Group.[4] To obtain perspectives on limitations revealed by the crisis and regulatory efforts to address these limitations, we also spoke with officials from the federal financial regulators and market participants (two securities firms, a large bank, and a credit rating agency) discussed above. Finally, we reviewed prior GAO work on the need to modernize the financial regulatory system and the U.S. transition to Basel II for certain large financial institutions.

For our three objectives, we collected and analyzed data for descriptive purposes. For example, to identify leverage trends, we collected and analyzed publicly available financial data on selected financial institutions, including large broker-dealer and bank holding companies, and industrywide data, including the Federal Reserve's Flow of Funds data and Bureau of Economic Analysis's gross domestic product data. To illustrate trends in margin debt, we used margin debt data from the New York Stock Exchange and market capitalization data from the World Federation of Exchanges. To describe foreclosure trends, we collected and analyzed LoanPerformance's foreclosure data on certain types of mortgages. We assessed the reliability of the data and found they were sufficiently reliable for our purposes.

We conducted this performance audit from February 2009 and July 2009 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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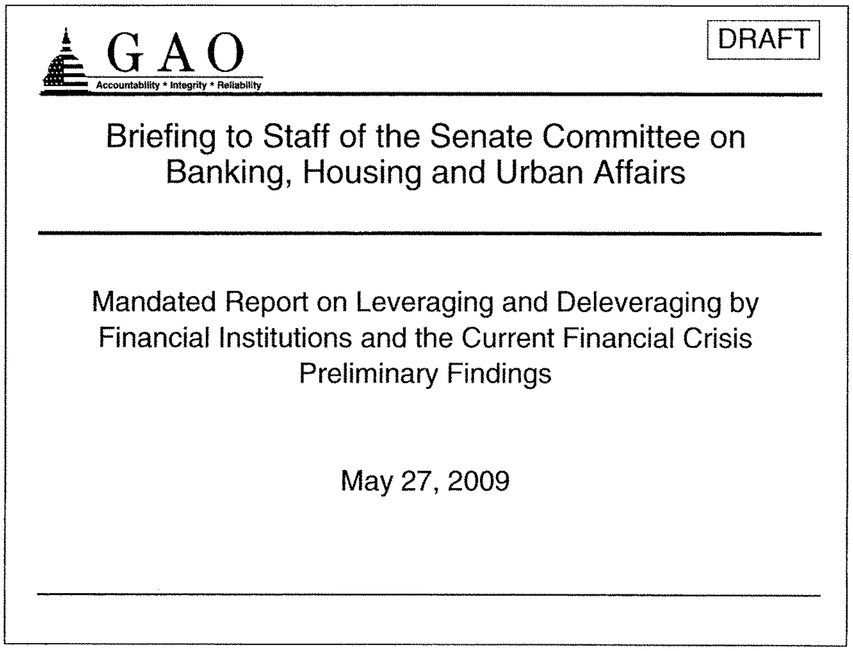
[4] The Senior Supervisors Group is composed of eight supervisory agencies: France's Banking Commission, Germany's Federal Financial Supervisory Authority, the Swiss Federal Banking Commission, the Financial Services Authority, the Federal Reserve, the Federal Reserve Bank of New York, OCC, and SEC.

Appendix II: Briefing to Congressional Staff



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Briefing to Staff of the Senate Committee on Banking, Housing and Urban Affairs

Mandated Report on Leveraging and Deleveraging by Financial Institutions and the Current Financial Crisis
Preliminary Findings

May 27, 2009

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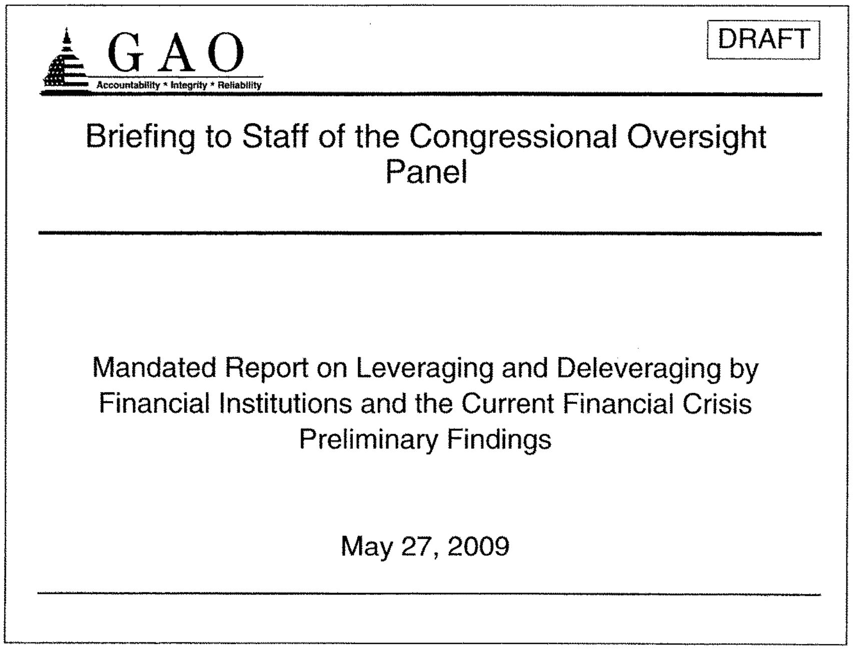
Briefing to Staff of the House Committee on Financial Services

Mandated Report on Leveraging and Deleveraging by Financial Institutions and the Current Financial Crisis
Preliminary Findings

May 27, 2009



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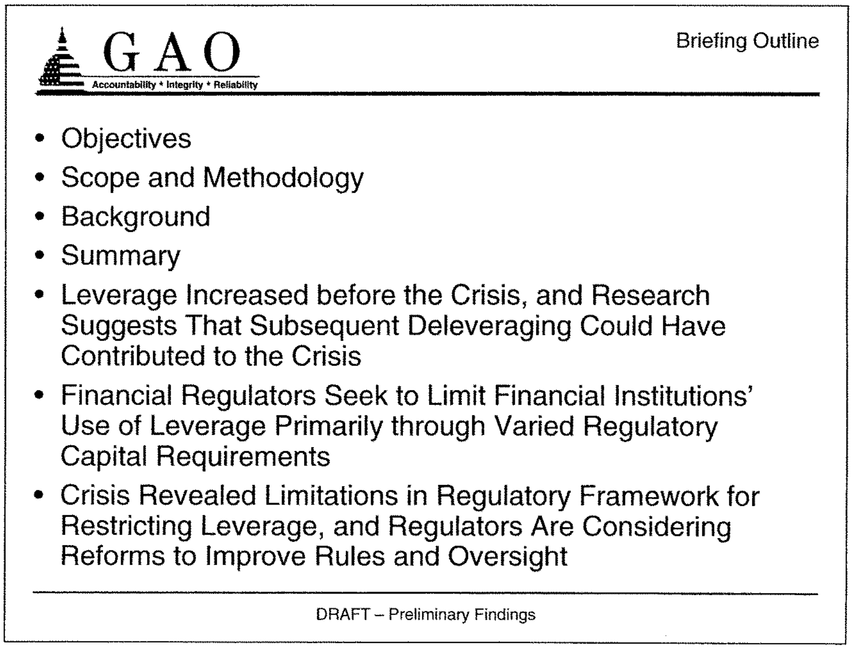
Briefing to Staff of the Congressional Oversight Panel

Mandated Report on Leveraging and Deleveraging by Financial Institutions and the Current Financial Crisis
Preliminary Findings

May 27, 2009



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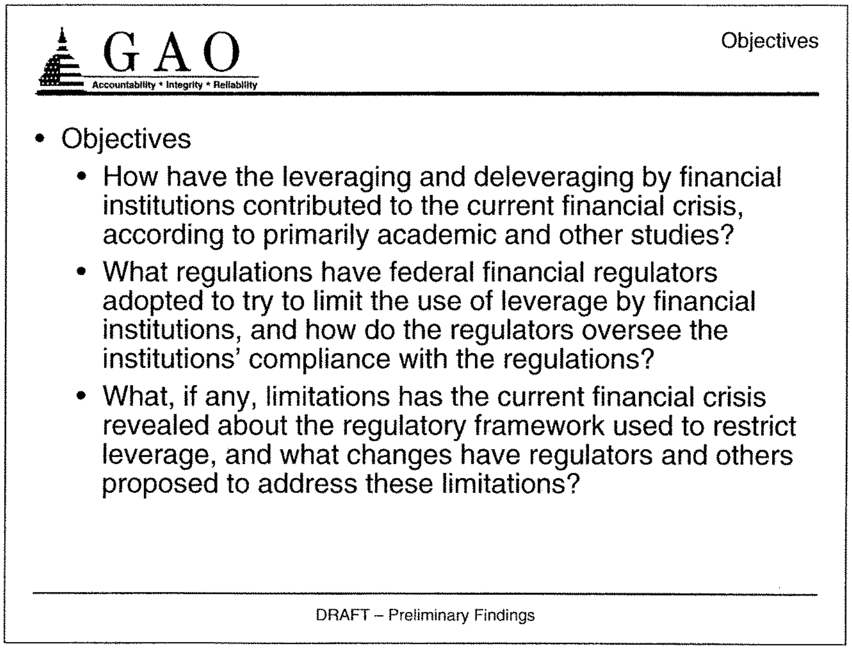
Briefing Outline

- Objectives
- Scope and Methodology
- Background
- Summary
- Leverage Increased before the Crisis, and Research Suggests That Subsequent Deleveraging Could Have Contributed to the Crisis
- Financial Regulators Seek to Limit Financial Institutions' Use of Leverage Primarily through Varied Regulatory Capital Requirements
- Crisis Revealed Limitations in Regulatory Framework for Restricting Leverage, and Regulators Are Considering Reforms to Improve Rules and Oversight

DRAFT – Preliminary Findings



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Objectives

- Objectives
  - How have the leveraging and deleveraging by financial institutions contributed to the current financial crisis, according to primarily academic and other studies?
  - What regulations have federal financial regulators adopted to try to limit the use of leverage by financial institutions, and how do the regulators oversee the institutions' compliance with the regulations?
  - What, if any, limitations has the current financial crisis revealed about the regulatory framework used to restrict leverage, and what changes have regulators and others proposed to address these limitations?

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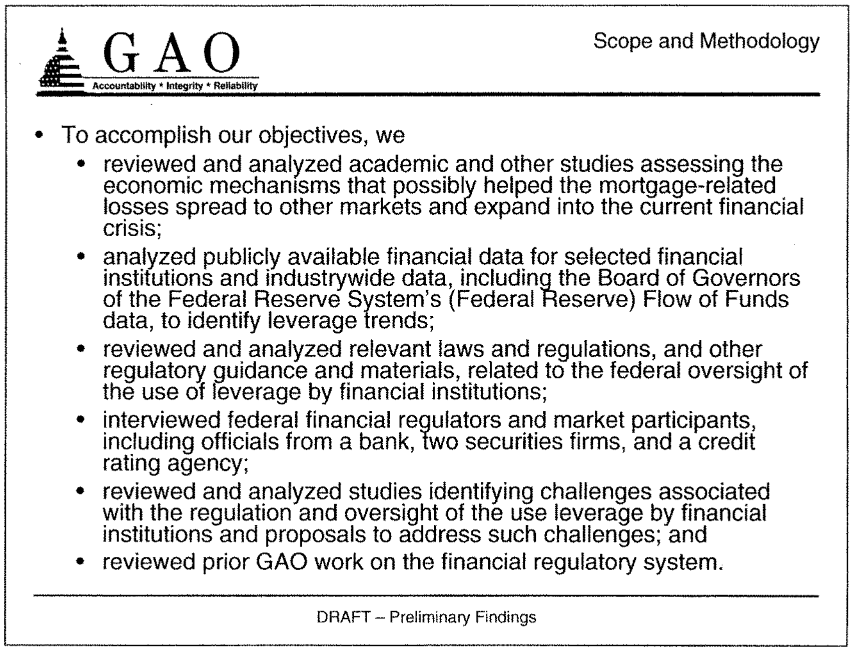

Scope and Methodology

- To accomplish our objectives, we
  - reviewed and analyzed academic and other studies assessing the economic mechanisms that possibly helped the mortgage-related losses spread to other markets and expand into the current financial crisis;
  - analyzed publicly available financial data for selected financial institutions and industrywide data, including the Board of Governors of the Federal Reserve System's (Federal Reserve) Flow of Funds data, to identify leverage trends;
  - reviewed and analyzed relevant laws and regulations, and other regulatory guidance and materials, related to the federal oversight of the use of leverage by financial institutions;
  - interviewed federal financial regulators and market participants, including officials from a bank, two securities firms, and a credit rating agency;
  - reviewed and analyzed studies identifying challenges associated with the regulation and oversight of the use leverage by financial institutions and proposals to address such challenges; and
  - reviewed prior GAO work on the financial regulatory system.

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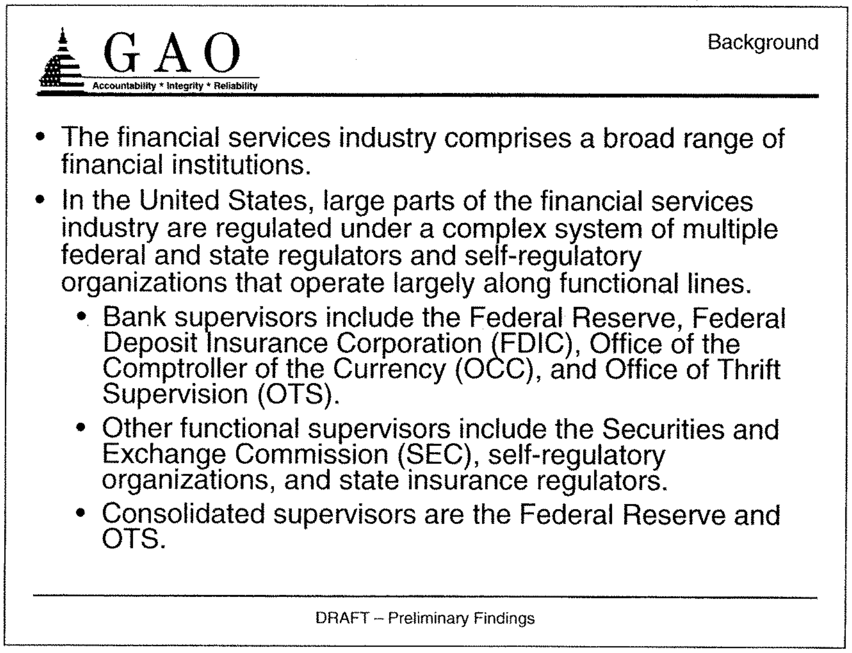

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Background

- The financial services industry comprises a broad range of financial institutions.
- In the United States, large parts of the financial services industry are regulated under a complex system of multiple federal and state regulators and self-regulatory organizations that operate largely along functional lines.
  - Bank supervisors include the Federal Reserve, Federal Deposit Insurance Corporation (FDIC), Office of the Comptroller of the Currency (OCC), and Office of Thrift Supervision (OTS).
  - Other functional supervisors include the Securities and Exchange Commission (SEC), self-regulatory organizations, and state insurance regulators.
  - Consolidated supervisors are the Federal Reserve and OTS.

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Background

- Leverage can be defined and measured in numerous ways.
  - One broad definition is the ratio between some measure of risk and capital.
  - A simple measure of balance sheet leverage is the ratio of total assets to equity, but this measure treats all assets as equally risky.
  - A risk-based leverage measure, as used by regulators, is the ratio of capital to risk-weighted assets.
- Many financial institutions use leverage to expand their ability to invest or trade in financial assets and to increase their return on equity.
- Financial institutions can increase their leverage, or their risk exposure relative to capital, in a number of ways. For example, they can use borrowed funds, rather than capital, to finance an asset or enter into derivatives contracts.

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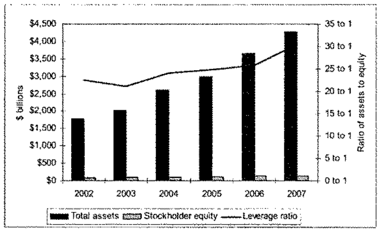
Background

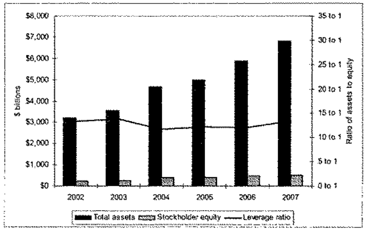
- Figures 1 and 2 show the changes in balance sheet leverage in aggregate for five large broker-dealer and bank holding companies, respectively, from 2002 to 2007.

Figure 1: Assets-to-Equity Ratio for Five Large U.S. Broker-Dealer Holding Companies, 2002 to 2007



Source: GAO analysis of annual report data for Bear Stearns, Goldman Sachs, Lehman Brothers, Morgan Stanley, and Merrill Lynch.

Figure 2: Assets-to-Equity Ratio for Five Large U.S. Bank Holding Companies, 2002 to 2007



Source: GAO analysis of annual report and Federal Reserve Y-9C data for Bank of America, Citigroup, JP Morgan Chase, Wachovia, and Wells Fargo.

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Summary

- Studies we reviewed suggested that leverage increased before the current crisis and deleveraging by financial institutions could have contributed to the current crisis in two ways. Specifically, deleveraging through (1) sales of financial assets during times of market stress could lead to downward price spirals for such assets and (2) the restriction of new lending could slow economic growth. However, these studies do not provide definitive findings.
- For financial institutions subject to regulation, federal financial regulators primarily limit the use of leverage by such institutions through varied regulatory capital requirements. In addition, regulators can oversee the capital adequacy of their regulated institutions through ongoing monitoring, which includes on-site examinations and off-site tools. However, other entities such as hedge funds generally are not subject to regulation that directly restricts their leverage; instead, market discipline plays the primary role in constraining risk taking and leveraging by hedge funds.

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Summary

- The financial crisis has revealed limitations in existing regulatory approaches used to restrict leverage. According to regulators, the regulatory capital framework did not ensure that institutions held capital commensurate with their risks and did not provide adequate incentives for institutions to build prudential buffers during the market upswing. When the crisis began, many institutions lacked the capital needed to absorb losses and faced pressure to deleverage. Regulators have called for reforms to improve the risk coverage of the regulatory capital framework and the systemwide focus of the financial regulatory system.

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Leveraging and Deleveraging Could Have Contributed to the Crisis

- Leverage within the financial sector increased before the financial crisis began around mid-2007, and financial institutions have attempted to deleverage since the crisis began.
  - Since no single measure of leverage exists, the studies we reviewed generally identified sources that aided in the build up of leverage before the crisis. These sources included the use of repurchase agreements, special purpose entities, and over-the-counter derivatives, such as credit default swaps.
  - Studies we reviewed found that banks have tended to manage their leverage in a procyclical manner—increasing their leverage when prices rise and decreasing their leverage when prices fall.
  - Despite generally reducing their exposure to subprime mortgages through securitization, some banks ended up with large exposures to such mortgages relative to their capital. For example, some banks held mortgage-related securities for trading or investment purpose; some were holding mortgages or mortgage-related securities that they planned to securitize but could not do so after the crisis began, and some brought onto their balance sheets mortgage-related securities held by structured investment vehicles.
  - Following the onset of the financial crisis, banks and financial institutions have attempted to deleverage in a number of ways, including raising equity and selling assets.

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Leveraging and Deleveraging Could Have Contributed to the Crisis

- Some studies suggested that deleveraging through asset sales could lead to downward spirals in asset prices under certain circumstances and contribute to a crisis.
  - In theory, a sharp decline in an asset's price can become self-sustaining and lead to a financial market crisis, because financial intermediation has moved into markets and away from institutions. But not all academics subscribe to this theory.
  - Studies we reviewed suggested that deleveraging through asset sales can lead to a downward asset spiral during times of market stress when market liquidity is low.
  - Studies we reviewed also suggested that deleveraging through asset sales could lead to a downward asset spiral when funding liquidity, or the ease with which firms can obtain funding, is low.
- Alternative theories also may help to explain the recent decline in asset prices.

Leveraging and Deleveraging Could Have Contributed to the Crisis

- Studies suggested that deleveraging by restricting new lending could have a negative effect on economic growth.
    - The concern is that banks will need to cut back their lending to restore their balance sheets, leading to a decline in consumption and investment spending, which reduces business and household incomes and negatively affects the real economy.
    - A former Federal Reserve official noted that banks are important providers of credit, but a key factor in the current crisis is the sharp decline in securities issuance, which has to be an important part of why the current financial market turmoil is affecting economic activity. The official said that the mortgage credit losses are a problem because they are hitting bank balance sheets at the same time that the securitization market is experiencing difficulties.

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Leveraging and Deleveraging Could Have Contributed to the Crisis

- Regulators and market participants that we interviewed had mixed views about the effects of deleveraging in the current crisis.
  - Some regulators and market participants said that asset sales generally have not led to downward price spirals, but others said that asset sales of a broad range of debt instruments have led to such spirals.
  - Regulators and market participants told us that some banks have tightened their lending standards for some types of loans, such as ones that have less favorable risk-adjusted returns or have been performing poorly. Federal bank examiners told us that the tightening of lending standards corresponded with a decline in loan demand.
  - Federal bank examiners told us that large banks rely on their ability to securitize loans to facilitate their ability to make such loans and, thus the inability to securitize loans has impaired their ability to make loans.
  - Since the crisis began, federal regulators and other authorities have facilitated financial intermediation by banks and the securities markets.

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Federal Financial Regulatory Oversight of Use of Leverage by Financial Institutions

- Federal banking and thrift regulators (Federal Reserve, FDIC, OCC and OTS) try to restrict the use of leverage by their regulated financial institutions primarily through minimum risk-based capital and leverage requirements.
    - Banks and thrifts are required to meet two minimum risk-based capital ratios. However, regulators told us that they can require an institution to meet more than the minimum requirements if, for example, the institution has concentrated positions or a high risk profile.
    - Regulators impose minimum leverage ratios on banks and thrifts to provide a cushion against risks not explicitly covered in the risk-based capital requirements (such as for operational weaknesses in internal policies, systems, and controls).
    - Regulators are required to classify institutions based on their level of capital and take increasingly severe actions, known as prompt corrective action, as an institution's capital deteriorates.
- Federal bank and thrift regulators oversee the capital adequacy of their regulated institutions through ongoing monitoring, which includes on-site examinations and off-site tools.
    - Examiners evaluate the institution's overall risk exposure with particular emphasis on what is known as CAMELS—the adequacy of its capital, and asset quality, the quality of its management and internal control procedures, the strength of its earnings, the adequacy of its liquidity, and its sensitivity to market risk.

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Federal Financial Regulatory Oversight of Use of Leverage by Financial Institutions

  - Regulators can also use off-site tools to monitor the capital adequacy of institutions such as by remotely assessing the financial condition of their regulated institutions and plan the scope of on-site examinations.
  - Regulators also can conduct targeted reviews, such as those related to capital adequacy of their regulated entities.
- Although bank holding companies are subject to similar capital and leverage ratio requirements as banks, thrift holding companies are not subject to such requirements.
  - Bank holding companies are subject to risk-based capital and leverage ratio requirements, which are similar to those applied to banks.
  - In contrast, OTS requires that thrift holding companies hold a "prudential" level of capital on a consolidated basis to support the risk profile of the company.
  - To supervise the capital adequacy of bank and thrift holding companies, the Federal Reserve and OTS, respectively, focus on those business activities posing the greatest risk to holding companies and managements' processes for identifying, measuring, monitoring, and controlling those risks.
  - The Federal Reserve and OTS have a range of formal and informal actions they can take to enforce their regulations for holding companies and they also monitor the capital adequacy of their respective regulated holding companies by obtaining uniform information from their holding companies and conducting peer analysis.

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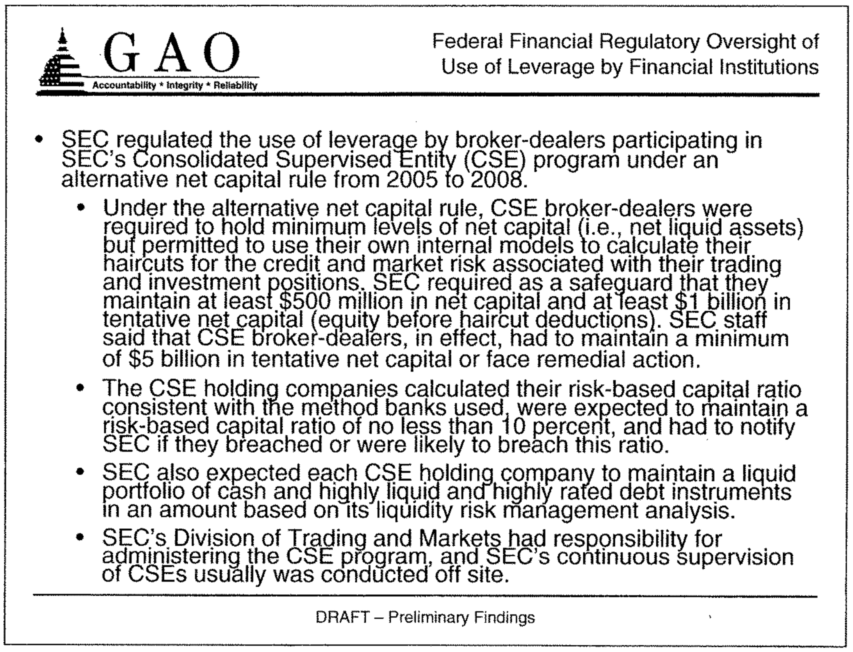

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Federal Financial Regulatory Oversight of Use of Leverage by Financial Institutions

- SEC regulated the use of leverage by broker-dealers participating in SEC's Consolidated Supervised Entity (CSE) program under an alternative net capital rule from 2005 to 2008.
  - Under the alternative net capital rule, CSE broker-dealers were required to hold minimum levels of net capital (i.e., net liquid assets) but permitted to use their own internal models to calculate their haircuts for the credit and market risk associated with their trading and investment positions. SEC required as a safeguard that they maintain at least $500 million in net capital and at least $1 billion in tentative net capital (equity before haircut deductions). SEC staff said that CSE broker-dealers, in effect, had to maintain a minimum of $5 billion in tentative net capital or face remedial action.
  - The CSE holding companies calculated their risk-based capital ratio consistent with the method banks used, were expected to maintain a risk-based capital ratio of no less than 10 percent, and had to notify SEC if they breached or were likely to breach this ratio.
  - SEC also expected each CSE holding company to maintain a liquid portfolio of cash and highly liquid and highly rated debt instruments in an amount based on its liquidity risk management analysis.
  - SEC's Division of Trading and Markets had responsibility for administering the CSE program, and SEC's continuous supervision of CSEs usually was conducted off site.

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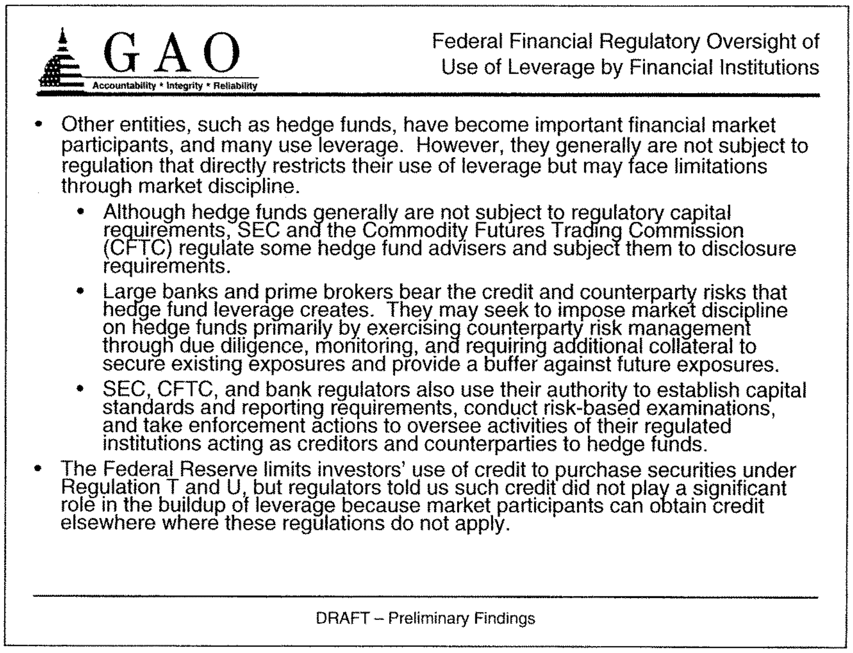

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Federal Financial Regulatory Oversight of Use of Leverage by Financial Institutions

- Other entities, such as hedge funds, have become important financial market participants, and many use leverage. However, they generally are not subject to regulation that directly restricts their use of leverage but may face limitations through market discipline.
  - Although hedge funds generally are not subject to regulatory capital requirements, SEC and the Commodity Futures Trading Commission (CFTC) regulate some hedge fund advisers and subject them to disclosure requirements.
  - Large banks and prime brokers bear the credit and counterparty risks that hedge fund leverage creates. They may seek to impose market discipline on hedge funds primarily by exercising counterparty risk management through due diligence, monitoring, and requiring additional collateral to secure existing exposures and provide a buffer against future exposures.
  - SEC, CFTC, and bank regulators also use their authority to establish capital standards and reporting requirements, conduct risk-based examinations, and take enforcement actions to oversee activities of their regulated institutions acting as creditors and counterparties to hedge funds.
- The Federal Reserve limits investors' use of credit to purchase securities under Regulation T and U, but regulators told us such credit did not play a significant role in the buildup of leverage because market participants can obtain credit elsewhere where these regulations do not apply.

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Crisis Revealed Limitations in Regulatory Framework for Restricting Leverage

The existing regulatory capital framework did not fully capture certain risks.

- A key goal of the regulatory capital framework is to align capital requirements with risks.
- However, according to regulators, many large financial institutions and their regulators underestimated capital needs for certain risk exposures.
  - **Credit risks** – The limited risk-sensitivity of the Basel I framework allowed banks to increase certain credit risk exposures without making commensurate increases in their capital requirements.
  - **Trading book risks** – Internal risk models, as applied by some large banks, underestimated the market risk and capital needs for certain trading assets.
  - **Liquidity risks** – Many institutions underestimated their vulnerability to a prolonged disruption in market liquidity.
  - **Off-balance sheet exposures** – Some large banks held no capital against the risk that certain special purpose entity (SPE) assets could have to be brought back on the bank's balance sheet if these entities experienced difficulties.
- The crisis illustrated challenges with increasing reliance on internal risk models for calculating capital requirements.
- Through forums such as the President's Working Group on Financial Markets and the Financial Stability Forum, U.S. and foreign regulators have called for changes to better align capital requirements with risks.

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Crisis Revealed Limitations in Regulatory Framework for Restricting Leverage

The regulatory framework may contribute to procyclical leverage trends.

- According to regulators, the tendency for leverage to move procyclically—increasing in strong markets and decreasing when market conditions deteriorate—can amplify business cycle fluctuations and exacerbate financial instability.
- U.S. regulators have expressed concern that capital requirements did not provide adequate incentives to increase loss-absorbing capital buffers during the market upswing, when it would have been less costly to do so.
- According to regulators, several interacting factors can cause capital buffers to fall during a market expansion and rise during a contraction. These factors include:
  - limitations in risk measurement,
  - accounting rules, and
  - market discipline.

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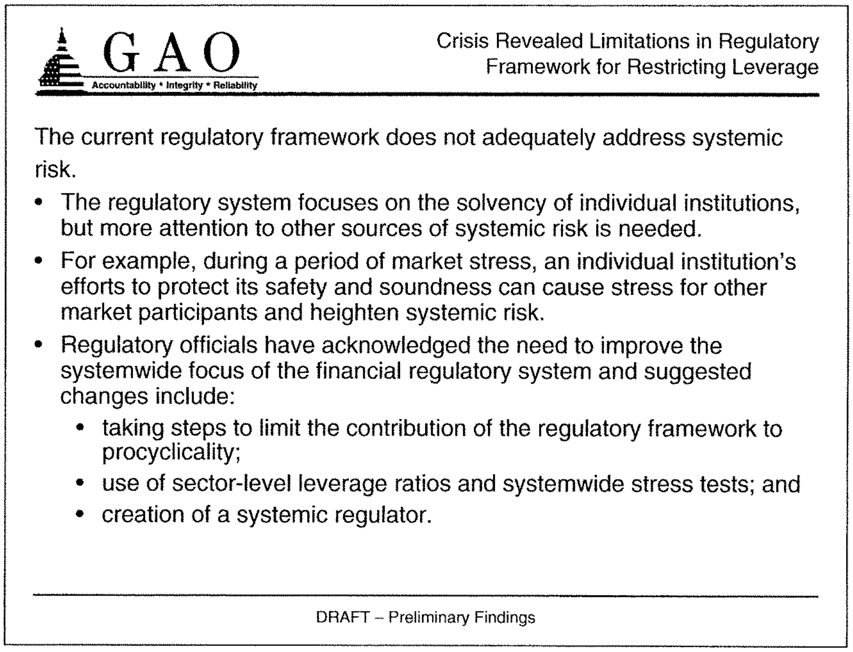

Crisis Revealed Limitations in Regulatory Framework for Restricting Leverage

The current regulatory framework does not adequately address systemic risk.

- The regulatory system focuses on the solvency of individual institutions, but more attention to other sources of systemic risk is needed.
- For example, during a period of market stress, an individual institution's efforts to protect its safety and soundness can cause stress for other market participants and heighten systemic risk.
- Regulatory officials have acknowledged the need to improve the systemwide focus of the financial regulatory system and suggested changes include:
  - taking steps to limit the contribution of the regulatory framework to procyclicality;
  - use of sector-level leverage ratios and systemwide stress tests; and
  - creation of a systemic regulator.

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Appendix III: Transition to Basel II Has Been Driven by Limitations of Basel I and Advances in Risk Management at Large

(Information in this appendix is based solely on a GAO report issued in early 2007.[1] Thus, the information does not capture any of the events that have transpired since the current financial crisis began.)

When established internationally in 1988, Basel I represented a major step forward in linking capital to risks taken by banking organizations, strengthening banks' capital positions, and reducing competitive inequality among international banks. Regulatory officials have noted that Basel I continues to be an adequate capital framework for most banks, but its limitations make it increasingly inadequate for the largest and most internationally active banks. As implemented in the United States, Basel I consists of five broad credit risk categories, or risk weights (table 2).[2] Banks must hold total capital equal to at least 8 percent of the total value of their risk-weighted assets and tier 1 capital of at least 4 percent. All assets are assigned a risk weight according to the credit risk of the obligor and the nature of any qualifying collateral or guarantee, where relevant. Off-balance sheet items, such as credit derivatives and loan commitments, are converted into credit equivalent amounts and also assigned risk weights. The risk categories are broadly intended to assign higher risk weights to—and require banks to hold more capital for—higher risk assets.

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[1] See GAO, *Risk Based Capital: Bank Regulators Need to Improve Transparency and Overcome Impediments to Finalizing Basel II Framework*, GAO-07-253 (Washington, D.C.: Feb. 15, 2007).

[2] In addition to the risk weights in table 2, a dollar-for-dollar capital charge applies for certain recourse obligations. See 66 Fed. Reg. 59614, 59620 (Nov. 29, 2001).

Table 2: U.S. Basel I Credit risk Categories

Major assets	Risk weight
Cash: claims on or guaranteed by central banks of Organization for Economic Cooperation and Development countries; claims on or guaranteed by Organization for Economic Cooperation and Development central governments and U.S. government agencies. The zero weight reflects the lack of credit risk associated with such positions.	0%
Claims on banks in Organization for Economic Cooperation and Development countries, obligations of government-sponsored enterprises, or cash items in the process of collection.	20%
Most one-to-four family residential mortgages; certain privately issued mortgage-backed securities and municipal revenue bonds.	50%
Represents the presumed bulk of the assets of commercial banks. It includes commercial loans, claims on non-Organization for Economic Cooperation and Development central governments, real assets, certain one-to-four family residential mortgages not meeting prudent underwriting standards, and some multifamily residential mortgages.	100%
Asset-backed and mortgage-backed securities and other on-balance sheet positions in asset securitizations that are rated one category below investment grade.	200%

Source: GAO analysis of federal regulations. See, e.g., 12 C.F.R. Part 3, App. A (OCC).

However, Basel I's risk-weighting approach does not measure an asset's level of risk with a high degree of accuracy, and the few broad categories available do not adequately distinguish among assets within a category that have varying levels of risk. For example, although commercial loans can vary widely in their levels of credit risk, Basel I assigns the same 100 percent risk weight to all these loans. Such limitations create incentives for banks to engage in regulatory capital arbitrage—behavior in which banks structure their activities to take advantage of limitations in the regulatory capital framework. By doing so, banks may be able to increase their risk exposure without making a commensurate increase in their capital requirements.

In addition, Basel I recognizes the important role of credit risk mitigation activities only to a limited extent. By reducing the credit risk of banks' exposures, techniques such as the use of collateral, guarantees, and credit derivatives play a significant role in sound risk management. However, many of these techniques are not recognized for regulatory capital purposes. For example, the U.S. Basel I framework recognizes collateral and guarantees in only a limited range of cases.[3] It does not recognize many other forms of collateral and guarantees, such as investment grade corporate debt securities as collateral or guarantees by externally rated corporate entities. As a result, regulators have indicated that Basel II should provide for a better recognition of credit risk mitigation techniques than Basel I.

Furthermore, Basel I does not address all major risks faced by banking organizations, resulting in required capital that may not fully address the entirety of banks' risk profiles. Basel I originally focused on credit risk, a major source of risk for most banks, and was amended in 1996 to include market risk from trading activity. However, banks face many other significant risks—including interest rate, operational, liquidity, reputational, and strategic risks—which could cause unexpected losses for which banks should hold capital. For example, many banks have assumed increased operational risk profiles in recent years, and at some banks operational risk is the dominant risk.[4] Because minimum required capital under Basel I does not depend directly on these other types of risks, U.S. regulators use the supervisory review process to ensure that each bank holds capital above these minimums, at a level that is commensurate with its entire risk profile. In recognition of Basel I's limited risk focus, Basel II aims for a more comprehensive approach by adding an explicit capital charge for operational risk and by using supervisory review (already a part of U.S. regulators' practices) to address all other risks.

Banks are developing new types of financial transactions that do not fit well into the risk weights and credit conversion factors in the current standards. For example, there has been significant growth in securitization activity, which banks engaged in partly as regulatory arbitrage opportunities.[5] To respond to emerging risks associated with the growth in derivatives, securitization, and other off-balance sheet transactions, federal regulators have amended the risk-based capital framework numerous times since implementing Basel I in 1992. Some of these revisions have been international efforts, while others are specific to the United States. For example, in 1996, the United States and other Basel Committee members adopted the Market Risk Amendment, which requires capital for market risk exposures arising from banks' trading activities.[6] By contrast, federal regulators amended the U.S. framework in 2001 to better address risk for asset securitizations.[7] These changes, while consistent with early proposals of Basel II, were not adopted by other countries at the time. The finalized international Basel II accord, which other countries are now adopting, incorporates many of these changes.

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[3] As implemented in the United States, Basel I assigns reduced risk weights to exposures collateralized by cash on deposit; securities issued or guaranteed by central governments of Organization for Economic Cooperation and Development countries, U.S. government agencies, and U.S. government-sponsored enterprises; and securities issued by multilateral lending institutions. Basel I also has limited recognition of guarantees, such as those made by Organization for Economic Cooperation and Development countries, central governments, and certain other entities. See 12 C.F.R. Part 3 (OCC); 12 C.F.R. Parts 208 and 225 (Federal Reserve); 12 C.F.R. Part 325 (FDIC); and 12 C.F.R. Part 567 (OTS).

[4] The Basel Committee defines operational risk as the risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events, including legal risks, but excluding strategic and reputational risk. Examples of operational risks include fraud, legal settlements, systems failures, and business disruptions.

Despite these amendments to the current framework, the simple risk-weighting approach of Basel I has not kept pace with more advanced risk measurement approaches at large banking organizations. By the late 1990s, some large banking organizations had begun developing economic capital models, which use quantitative methods to estimate the amount of capital required to support various elements of an organization's risks. Banks use economic capital models as tools to inform their management activities, including measuring risk-adjusted performance, setting pricing and limits on loans and other products, and allocating capital among various business lines and risks. Economic capital models measure risks by estimating the probability of potential losses over a specified period and up to a defined confidence level using historical loss data. This method has the potential for more meaningful risk measurement than the current regulatory framework, which differentiates risk only to a limited extent, mostly based on asset type rather than on an asset's underlying risk characteristics. Recognizing the potential of such advanced risk measurement techniques to inform the regulatory capital framework, Basel II introduces "advanced approaches" that share a conceptual framework that is similar to banks' economic capital models. With these advanced approaches, regulators aim not only to increase the risk sensitivity of regulatory measures of risk but also to encourage the advancement of banks' internal risk management practices.

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[5] Securitization is the process of pooling debt obligations and dividing that pool into portions (called tranches) that can be sold as securities in the secondary market. Banks can use securitization for regulatory arbitrage purposes by, for example, selling high-quality tranches of pooled credit exposures to third-party investors, while retaining a disproportionate amount of the lower-quality tranches and therefore, the underlying credit risk.

[6] 61 Fed. Reg. 47358 (Sept. 6, 1996).

[7] 66 Fed. Reg. 59614 (Nov. 29, 2001).

Although the advanced approaches of Basel II aim to more closely align regulatory and economic capital, the two differ in significant ways, including in their fundamental purpose, scope, and consideration of certain assumptions. Given these differences, regulatory and economic capital are not intended to be equivalent. Instead, some regulators expect that the systems and processes that a bank uses for regulatory capital purposes should be consistent with those used for internal risk management purposes. Regulatory and economic capital approaches both share a similar objective: to relate potential losses to a bank's capital in order to ensure it can continue to operate. However, economic capital is defined by bank management for internal business purposes, without regard for the external risks the bank's performance poses on the banking system or broader economy. By contrast, regulatory capital requirements must set standards for solvency that support the safety and soundness of the overall banking system. In addition, while the precise definition and measurement of economic capital can differ across banks, regulatory capital is designed to apply consistent standards and definitions to all banks. Economic capital also typically includes a benefit from portfolio diversification, while the calculation of credit risk in Basel II fails to reflect differences in diversification benefits across banks and over time. Also, certain key assumptions may differ, such as the time horizon, confidence level or solvency standard, and data definitions. For example, the probability of default can be measured at a point in time (for economic capital) or as a long-run average measured through the economic cycle (for Basel II). Moreover, economic capital models may explicitly measure a broader range of risks, while regulatory capital as proposed in Basel II will explicitly measure only credit, operational, and where relevant, market risks.

Appendix IV: Three Pillars of Basel II

Basel II aims for a more comprehensive approach to addressing risks, based on three pillars: (1) minimum capital requirements, (2) supervisory review, and (3) market discipline in the form of increased public disclosure.

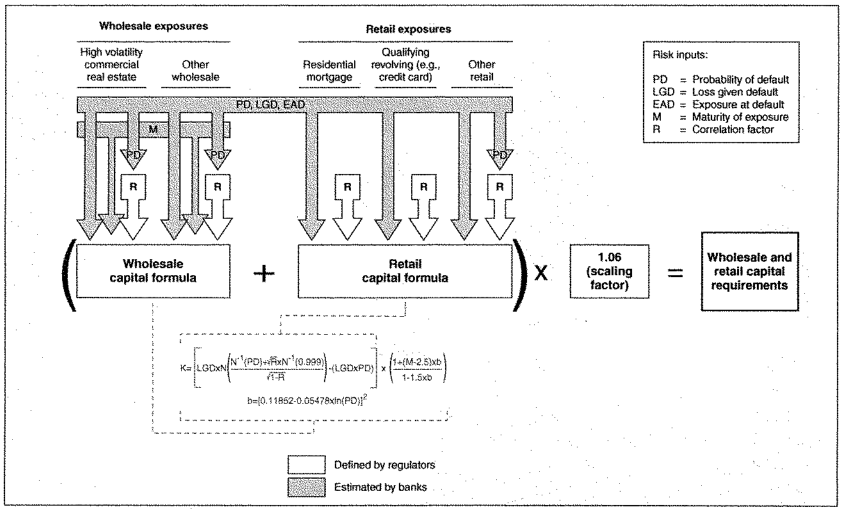
Pillar 1: Minimum Capital Requirements

Pillar 1 of the advanced approaches rule features explicit minimum capital requirements, designed to ensure bank solvency by providing a prudent level of capital against unexpected losses for credit, operational, and market risk. The advanced approaches, which are the only measurement approaches available to and required for core banks in the United States, will make capital requirements depend in part on a bank's own assessment, based on historical data, of the risks to which it is exposed.

Credit Risk

Under the advanced internal ratings-based approach, banks must establish risk rating and segmentation systems to distinguish risk levels of their wholesale (most exposures to companies and governments) and retail (most exposures to individuals and small businesses) exposures, respectively. Banks use the results of these rating systems to estimate several risk parameters that are inputs to supervisory formulas. Figure 11 illustrates how credit risk will be calculated under the Basel II advanced internal ratings-based approach. Banks must first classify their assets into exposure categories and subcategories defined by regulators: for wholesale exposures those subcategories are high-volatility commercial real estate and other wholesale; for retail exposures those subcategories are residential mortgages, qualifying revolving exposures (e.g., credit cards), and other retail. Banks then estimate the following risk parameters, or inputs: the probability a credit exposure will default (probability of default or PD), the expected size of the exposure at the time of default (exposure at default or EAD), economic losses in the event of default (loss given default or LGD) in "downturn" (recession) conditions, and, for wholesale exposures, the maturity of the exposure (M). In order to estimate these inputs, banks must have systems for classifying and rating their exposures as well as a data management and maintenance system. The conceptual foundation of this process is that a statistical approach, based on historical data, will provide a more appropriate measure of risk and capital than a simple categorization of asset types, which does not differentiate precisely between risks. Regulators provide a formula for each exposure category that determines the required capital on the basis of these inputs. If all the assumptions in the supervisory formula were correct, the resulting capital requirement would exceed a bank's credit losses in a given year with 99.9 percent probability. That is, credit losses at the bank would exceed the capital requirement with a 1 in 1,000 chance in a given year, which could result in insolvency if the bank only held capital equal to the minimum requirement.

Figure 11: Computation of Wholesale and Retail Capital Requirements under the Advanced Internal Ratings-based Approach for Credit Risk


Wholesale exposures
High volatility commercial real estate
Other wholesale
Retail exposures
Residential mortgage
Qualifying revolving (e.g., credit card)
Other retail
Risk inputs:
PD = Probability of default
LGD = Loss given default
EAD = Exposure at default
M = Maturity of exposure
R = Correlation factor
PD, LGD, EAD
M
PD
R
Wholesale capital formula
+
Retail capital formula
X
1.06 (scaling factor)
=
Wholesale and retail capital requirements
$K=\left[LGD\times N\left(\frac{N^{-1}(PD)+\sqrt{R}\times N^{-1}(0.999)}{\sqrt{1-R}}\right)-(LGD\times PD)\right]\times\left(\frac{1+(M-2.5)\times b}{1-1.5\times b}\right)$
$b=[0.11852-0.05478\times ln(PD)]^2$
Defined by regulators
Estimated by banks

Source: GAO analysis of information from the advanced approaches rule.

Notes: This figure focuses on wholesale and retail nondefaulted exposures, an important component of the total credit risk calculation. The total credit risk capital requirement also covers defaulted wholesale and retail exposures, as well as risk from securitizations and equity exposures. A bank's qualifying capital is also adjusted, depending on whether its eligible credit reserves exceed or fall below its expected credit losses.

Banks may incorporate some credit risk mitigation, including guarantees, collateral, or derivatives, into their estimates of PD or LGD to reflect their efforts to hedge against unexpected losses.

Operational Risk

To determine minimum required capital for operational risk, banks will use their own quantitative models of operational risk that incorporate elements required in the advanced approaches rule. To qualify to use the advanced measurement approaches for operational risk, a bank must have operational risk management processes, data and assessment systems, and quantification systems. The elements that banks must incorporate into their operational risk data and assessment system are internal operational loss event data, external operational loss event data, results of scenario analysis, and assessments of the bank's business environment and internal controls. Banks meeting the advanced measurement approaches' qualifying criteria would use their internal operational risk quantification system to calculate the risk-based capital requirement for operational risk, subject to a solvency standard specified by regulators, to produce a capital buffer for operational risk designed to be exceeded only once in a thousand years.

Market Risk

Regulators have allowed certain banks to use their internal models to determine required capital for market risk since 1996 (known as the market risk amendment or MRA). Under the MRA, a bank's internal models are used to estimate the 99th percentile of the bank's market risk loss distribution over a 10-business-day horizon, in other words a solvency standard designed to exceed trading losses for 99 out of 100 10-business-day intervals. The bank's market risk capital requirement is based on this estimate, generally multiplied by a factor of three. The agencies implemented this multiplication factor to provide a prudential buffer for market volatility and modeling error. The OCC, Federal Reserve, and FDIC are proposing modifications to the market risk rules, to include modifications to the MRA developed by the Basel Committee, in a separate notice of proposed rulemaking issued concurrently with the proposal for credit and operational risk. OTS is proposing its own market risk rule, including the proposed modifications, as a part of that separate notice of proposed rulemaking.

In previous work, regulatory officials generally said that changes to the rules for determining capital adequacy for market risk were relatively modest and not a significant overhaul. The regulators have described the objectives of the new market risk rule as including enhancing the sensitivity of required capital to risks not adequately captured in the current methodologies of the rule and enhancing the modeling requirements consistent with advances in risk management since the implementation of the MRA. In particular, the rule contains an incremental default risk capital requirement to reflect the growth in traded credit products, such as credit default swaps, that carry some default risk as well as market risk. The Basel Committee currently is in the process of finalizing more far-reaching modifications to the MRA to address issues highlighted by the financial crisis.

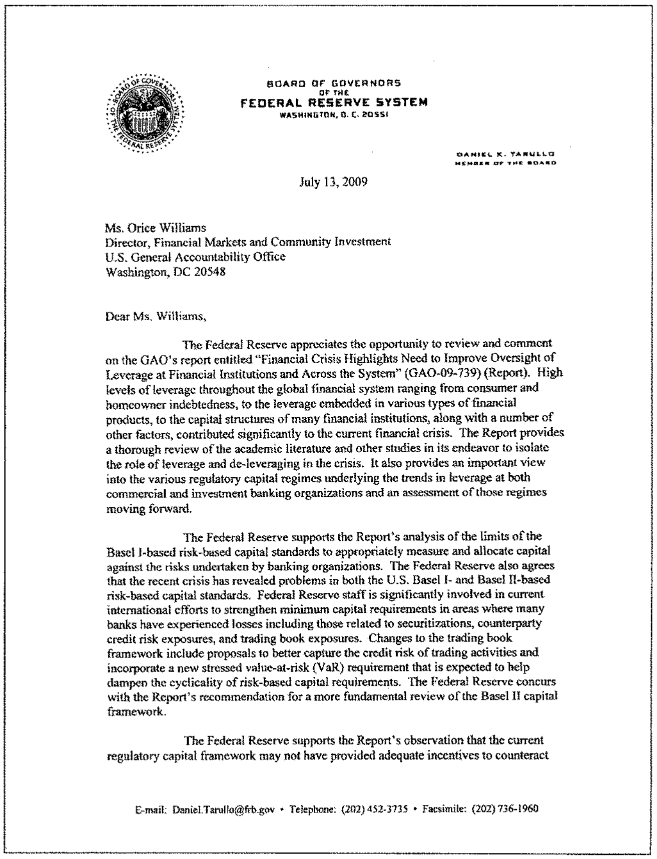
Pillar 2: Supervisory Review

The Pillar 2 framework for supervisory review is intended to ensure that banks have adequate capital to support all risks, including those not addressed in Pillar 1, and to encourage banks to develop and use better risk management practices. Banks adopting Basel II must have a rigorous process of assessing capital adequacy that includes strong board and senior management oversight, comprehensive assessment of risks, rigorous stress testing and validation programs, and independent review and oversight. In addition, Pillar 2 requires supervisors to review and evaluate banks' internal capital adequacy assessments and monitor compliance with regulatory capital requirements. Under Pillar 2, supervisors must conduct initial and ongoing qualification of banks for compliance with minimum capital calculations and disclosure requirements. Regulators must evaluate banks against established criteria for their (1) risk rating and segmentation system, (2) quantification process, (3) ongoing validation, (4) data management and maintenance, and (5) oversight and control mechanisms. Regulators are to assess a bank's implementation plan, planning and governance process, and parallel run, and ongoing performance. Under Pillar 2, regulators should also assess and address risks not captured by Pillar 1 such as credit concentration risk, interest rate risk, and liquidity risk.

Pillar 3: Market Discipline in the Form of Increased Disclosure

Pillar 3 is designed to encourage market discipline by requiring banks to disclose additional information and allowing market participants to more fully evaluate the institutions' risk profiles and capital adequacy. Such disclosure is particularly appropriate given that Pillar I allows banks more discretion in determining capital requirements through greater reliance on internal methodologies. Banks would be required to publicly disclose both quantitative and qualitative information on a quarterly and annual basis, respectively. For example, such information would include a bank's risk-based capital ratios and their capital components, aggregated information underlying the calculation of their risk-weighted assets, and the bank's risk assessment processes. In addition, federal regulators will collect, on a confidential basis, more detailed data supporting the capital calculations. Federal regulators would use this additional data, among other purposes, to assess the reasonableness and accuracy of a bank's minimum capital requirements and to understand the causes behind changes in a bank's risk-based capital requirements. Federal regulators have developed detailed reporting schedules to collect both public and confidential disclosure information.

Appendix V: Comments from the Board of Governors of the Federal Reserve System



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D. C. 20551

DANIEL K. TARULLO
MEMBER OF THE BOARD

July 13, 2009

Ms. Orice Williams
Director, Financial Markets and Community Investment
U.S. General Accountability Office
Washington, DC 20548

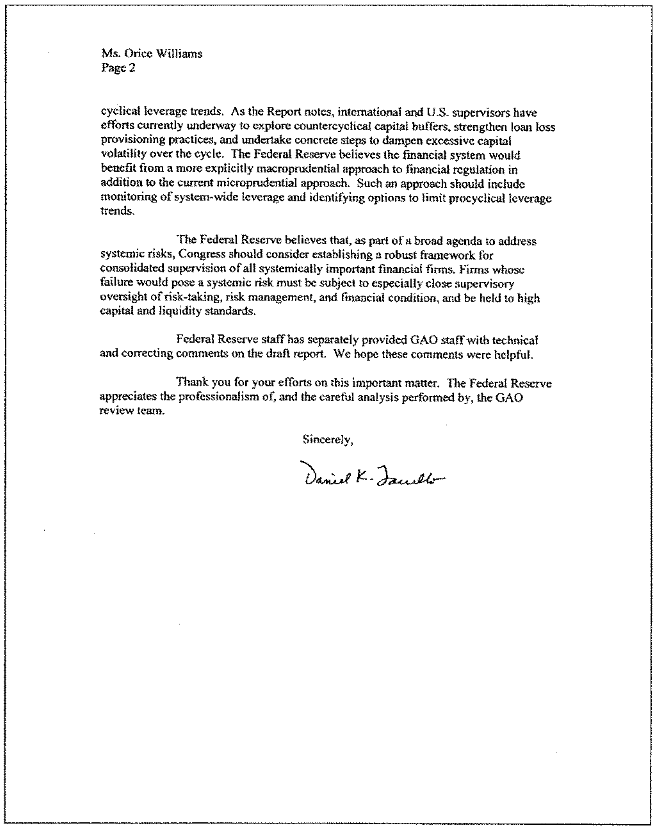
Dear Ms. Williams,

The Federal Reserve appreciates the opportunity to review and comment on the GAO's report entitled "Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across the System" (GAO-09-739) (Report). High levels of leverage throughout the global financial system ranging from consumer and homeowner indebtedness, to the leverage embedded in various types of financial products, to the capital structures of many financial institutions, along with a number of other factors, contributed significantly to the current financial crisis. The Report provides a thorough review of the academic literature and other studies in its endeavor to isolate the role of leverage and de-leveraging in the crisis. It also provides an important view into the various regulatory capital regimes underlying the trends in leverage at both commercial and investment banking organizations and an assessment of those regimes moving forward.

The Federal Reserve supports the Report's analysis of the limits of the Basel I-based risk-based capital standards to appropriately measure and allocate capital against the risks undertaken by banking organizations. The Federal Reserve also agrees that the recent crisis has revealed problems in both the U.S. Basel I- and Basel II-based risk-based capital standards. Federal Reserve staff is significantly involved in current international efforts to strengthen minimum capital requirements in areas where many banks have experienced losses including those related to securitizations, counterparty credit risk exposures, and trading book exposures. Changes to the trading book framework include proposals to better capture the credit risk of trading activities and incorporate a new stressed value-at-risk (VaR) requirement that is expected to help dampen the cyclicality of risk-based capital requirements. The Federal Reserve concurs with the Report's recommendation for a more fundamental review of the Basel II capital framework.

The Federal Reserve supports the Report's observation that the current regulatory capital framework may not have provided adequate incentives to counteract

E-mail: Daniel.Tarullo@frb.gov • Telephone: (202) 452-3735 • Facsimile: (202) 736-1960



Ms. Orice Williams
Page 2

cyclical leverage trends. As the Report notes, international and U.S. supervisors have efforts currently underway to explore countercyclical capital buffers, strengthen loan loss provisioning practices, and undertake concrete steps to dampen excessive capital volatility over the cycle. The Federal Reserve believes the financial system would benefit from a more explicitly macroprudential approach to financial regulation in addition to the current microprudential approach. Such an approach should include monitoring of system-wide leverage and identifying options to limit procyclical leverage trends.

The Federal Reserve believes that, as part of a broad agenda to address systemic risks, Congress should consider establishing a robust framework for consolidated supervision of all systemically important financial firms. Firms whose failure would pose a systemic risk must be subject to especially close supervisory oversight of risk-taking, risk management, and financial condition, and be held to high capital and liquidity standards.

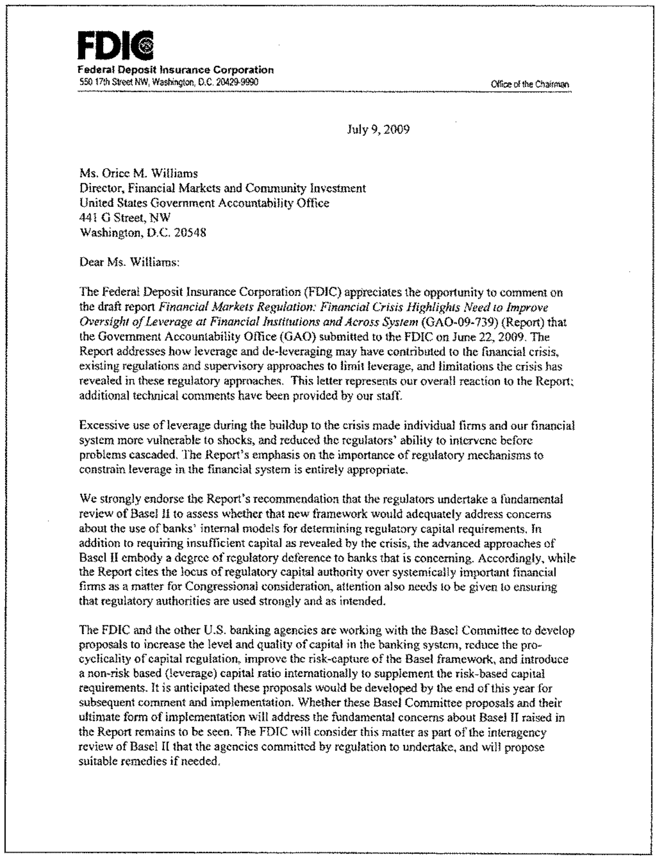
Federal Reserve staff has separately provided GAO staff with technical and correcting comments on the draft report. We hope these comments were helpful.

Thank you for your efforts on this important matter. The Federal Reserve appreciates the professionalism of, and the careful analysis performed by, the GAO review team.

Sincerely,

Daniel K. Tarullo

Appendix VI: Comments from the Federal Deposit Insurance Corporation



FDIC
Federal Deposit Insurance Corporation
550 17th Street NW, Washington, D.C. 20429-9990
Office of the Chairman

July 9, 2009

Ms. Orice M. Williams
Director, Financial Markets and Community Investment
United States Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

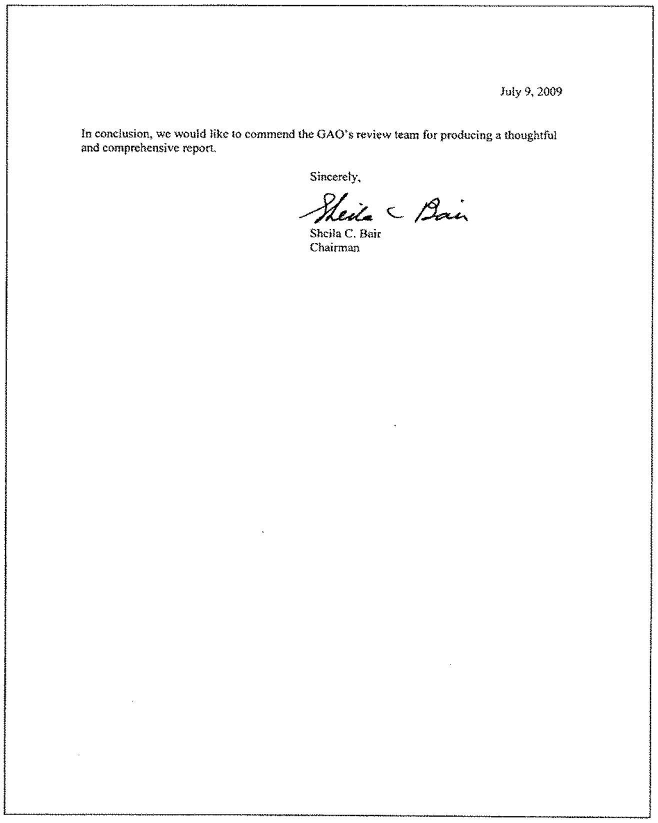
Dear Ms. Williams:

The Federal Deposit Insurance Corporation (FDIC) appreciates the opportunity to comment on the draft report *Financial Markets Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across System* (GAO-09-739) (Report) that the Government Accountability Office (GAO) submitted to the FDIC on June 22, 2009. The Report addresses how leverage and de-leveraging may have contributed to the financial crisis, existing regulations and supervisory approaches to limit leverage, and limitations the crisis has revealed in these regulatory approaches. This letter represents our overall reaction to the Report; additional technical comments have been provided by our staff.

Excessive use of leverage during the buildup to the crisis made individual firms and our financial system more vulnerable to shocks, and reduced the regulators' ability to intervene before problems cascaded. The Report's emphasis on the importance of regulatory mechanisms to constrain leverage in the financial system is entirely appropriate.

We strongly endorse the Report's recommendation that the regulators undertake a fundamental review of Basel II to assess whether that new framework would adequately address concerns about the use of banks' internal models for determining regulatory capital requirements. In addition to requiring insufficient capital as revealed by the crisis, the advanced approaches of Basel II embody a degree of regulatory deference to banks that is concerning. Accordingly, while the Report cites the locus of regulatory capital authority over systemically important financial firms as a matter for Congressional consideration, attention also needs to be given to ensuring that regulatory authorities are used strongly and as intended.

The FDIC and the other U.S. banking agencies are working with the Basel Committee to develop proposals to increase the level and quality of capital in the banking system, reduce the pro-cyclicality of capital regulation, improve the risk-capture of the Basel framework, and introduce a non-risk based (leverage) capital ratio internationally to supplement the risk-based capital requirements. It is anticipated these proposals would be developed by the end of this year for subsequent comment and implementation. Whether these Basel Committee proposals and their ultimate form of implementation will address the fundamental concerns about Basel II raised in the Report remains to be seen. The FDIC will consider this matter as part of the interagency review of Basel II that the agencies committed by regulation to undertake, and will propose suitable remedies if needed.



July 9, 2009

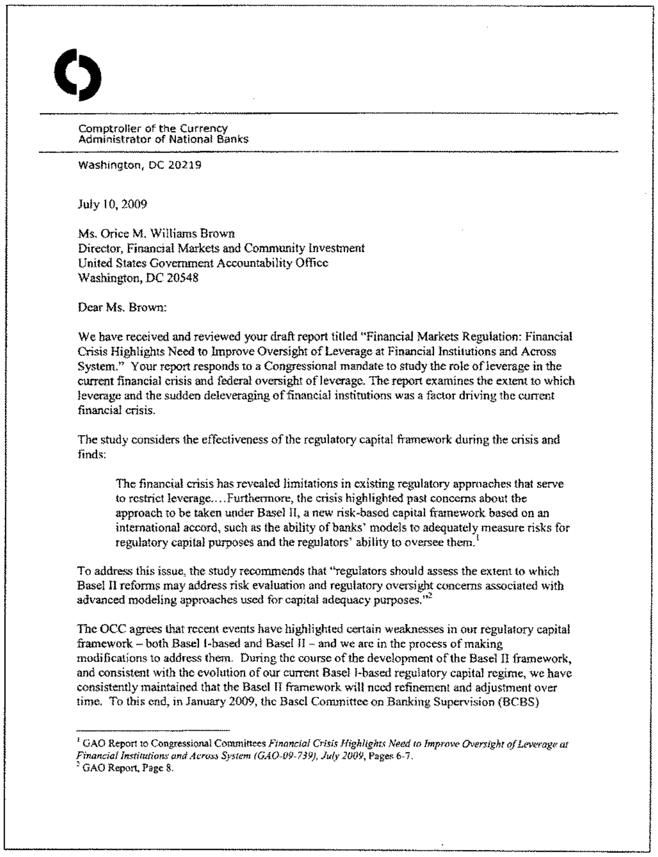
In conclusion, we would like to commend the GAO's review team for producing a thoughtful and comprehensive report.

Sincerely,

Sheila C Bair

Sheila C. Bair
Chairman

Appendix VII: Comments from the Office of the Comptroller of the Currency



Comptroller of the Currency
Administrator of National Banks

Washington, DC 20219

July 10, 2009

Ms. Orice M. Williams Brown
Director, Financial Markets and Community Investment
United States Government Accountability Office
Washington, DC 20548

Dear Ms. Brown:

We have received and reviewed your draft report titled "Financial Markets Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across System." Your report responds to a Congressional mandate to study the role of leverage in the current financial crisis and federal oversight of leverage. The report examines the extent to which leverage and the sudden deleveraging of financial institutions was a factor driving the current financial crisis.

The study considers the effectiveness of the regulatory capital framework during the crisis and finds:

> The financial crisis has revealed limitations in existing regulatory approaches that serve to restrict leverage.…Furthermore, the crisis highlighted past concerns about the approach to be taken under Basel II, a new risk-based capital framework based on an international accord, such as the ability of banks' models to adequately measure risks for regulatory capital purposes and the regulators' ability to oversee them.[1]

To address this issue, the study recommends that "regulators should assess the extent to which Basel II reforms may address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches used for capital adequacy purposes."[2]

The OCC agrees that recent events have highlighted certain weaknesses in our regulatory capital framework – both Basel I-based and Basel II – and we are in the process of making modifications to address them. During the course of the development of the Basel II framework, and consistent with the evolution of our current Basel I-based regulatory capital regime, we have consistently maintained that the Basel II framework will need refinement and adjustment over time. To this end, in January 2009, the Basel Committee on Banking Supervision (BCBS)

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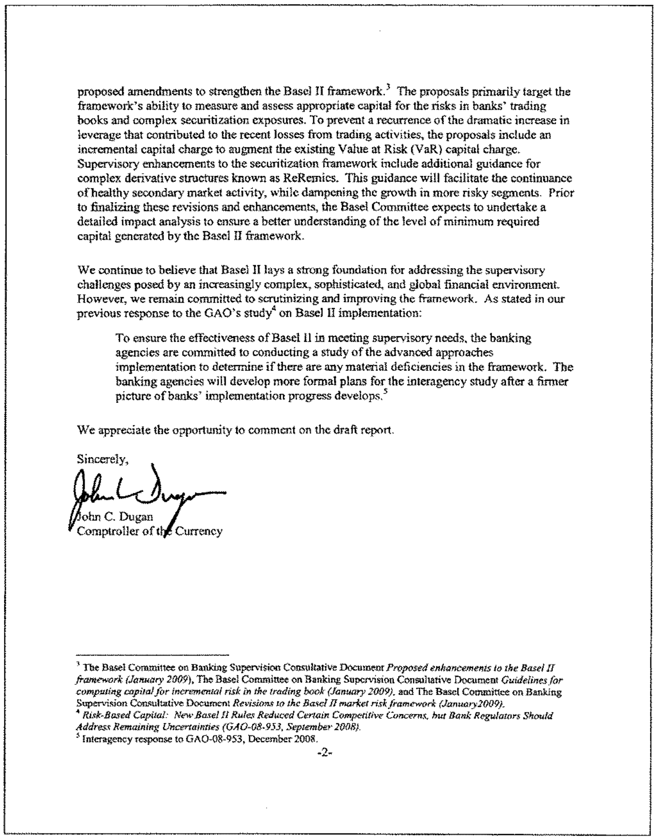
[1] GAO Report to Congressional Committees *Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across System (GAO-09-739), July 2009*, Pages 6-7.
[2] GAO Report, Page 8.



proposed amendments to strengthen the Basel II framework.[3] The proposals primarily target the framework's ability to measure and assess appropriate capital for the risks in banks' trading books and complex securitization exposures. To prevent a recurrence of the dramatic increase in leverage that contributed to the recent losses from trading activities, the proposals include an incremental capital charge to augment the existing Value at Risk (VaR) capital charge. Supervisory enhancements to the securitization framework include additional guidance for complex derivative structures known as ReRemics. This guidance will facilitate the continuance of healthy secondary market activity, while dampening the growth in more risky segments. Prior to finalizing these revisions and enhancements, the Basel Committee expects to undertake a detailed impact analysis to ensure a better understanding of the level of minimum required capital generated by the Basel II framework.

We continue to believe that Basel II lays a strong foundation for addressing the supervisory challenges posed by an increasingly complex, sophisticated, and global financial environment. However, we remain committed to scrutinizing and improving the framework. As stated in our previous response to the GAO's study[4] on Basel II implementation:

> To ensure the effectiveness of Basel II in meeting supervisory needs, the banking agencies are committed to conducting a study of the advanced approaches implementation to determine if there are any material deficiencies in the framework. The banking agencies will develop more formal plans for the interagency study after a firmer picture of banks' implementation progress develops.[5]

We appreciate the opportunity to comment on the draft report.

Sincerely,

John C. Dugan
Comptroller of the Currency

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[3] The Basel Committee on Banking Supervision Consultative Document *Proposed enhancements to the Basel II framework (January 2009)*, The Basel Committee on Banking Supervision Consultative Document *Guidelines for computing capital for incremental risk in the trading book (January 2009)*, and The Basel Committee on Banking Supervision Consultative Document *Revisions to the Basel II market risk framework (January2009)*.

[4] *Risk-Based Capital: New Basel II Rules Reduced Certain Competitive Concerns, but Bank Regulators Should Address Remaining Uncertainties (GAO-08-953, September 2008)*.

[5] Interagency response to GAO-08-953, December 2008.

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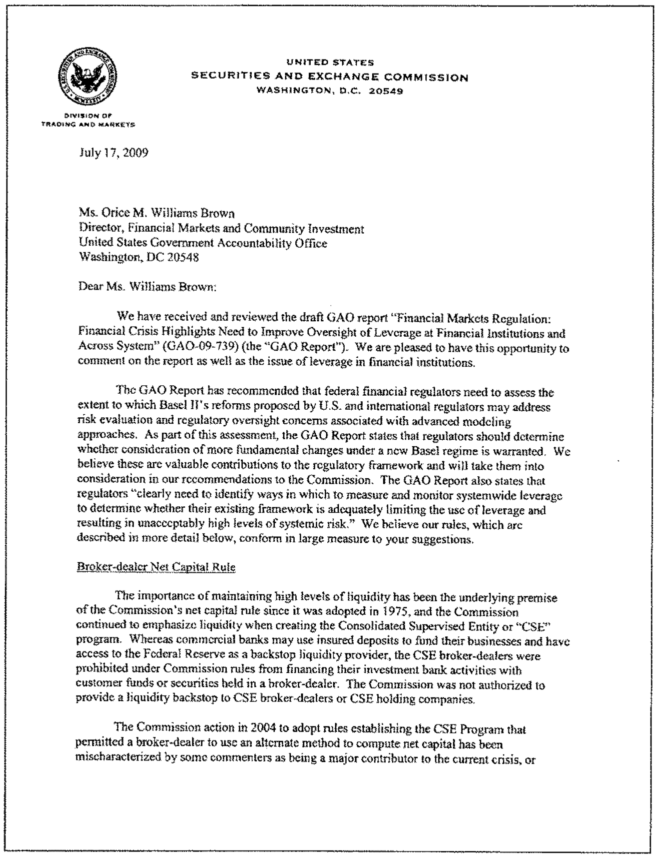
Appendix VIII: Comments from the Securities and Exchange Commission



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

DIVISION OF
TRADING AND MARKETS

July 17, 2009

Ms. Orice M. Williams Brown
Director, Financial Markets and Community Investment
United States Government Accountability Office
Washington, DC 20548

Dear Ms. Williams Brown:

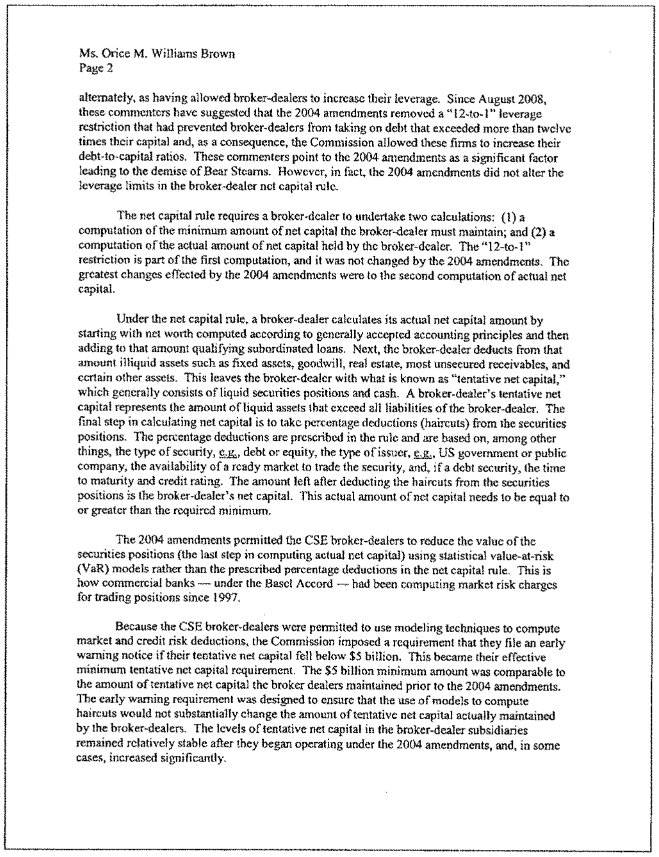
We have received and reviewed the draft GAO report "Financial Markets Regulation: Financial Crisis Highlights Need to Improve Oversight of Leverage at Financial Institutions and Across System" (GAO-09-739) (the "GAO Report"). We are pleased to have this opportunity to comment on the report as well as the issue of leverage in financial institutions.

The GAO Report has recommended that federal financial regulators need to assess the extent to which Basel II's reforms proposed by U.S. and international regulators may address risk evaluation and regulatory oversight concerns associated with advanced modeling approaches. As part of this assessment, the GAO Report states that regulators should determine whether consideration of more fundamental changes under a new Basel regime is warranted. We believe these are valuable contributions to the regulatory framework and will take them into consideration in our recommendations to the Commission. The GAO Report also states that regulators "clearly need to identify ways in which to measure and monitor systemwide leverage to determine whether their existing framework is adequately limiting the use of leverage and resulting in unacceptably high levels of systemic risk." We believe our rules, which are described in more detail below, conform in large measure to your suggestions.

Broker-dealer Net Capital Rule

The importance of maintaining high levels of liquidity has been the underlying premise of the Commission's net capital rule since it was adopted in 1975, and the Commission continued to emphasize liquidity when creating the Consolidated Supervised Entity or "CSE" program. Whereas commercial banks may use insured deposits to fund their businesses and have access to the Federal Reserve as a backstop liquidity provider, the CSE broker-dealers were prohibited under Commission rules from financing their investment bank activities with customer funds or securities held in a broker-dealer. The Commission was not authorized to provide a liquidity backstop to CSE broker-dealers or CSE holding companies.

The Commission action in 2004 to adopt rules establishing the CSE Program that permitted a broker-dealer to use an alternate method to compute net capital has been mischaracterized by some commenters as being a major contributor to the current crisis, or



Ms. Orice M. Williams Brown
Page 2

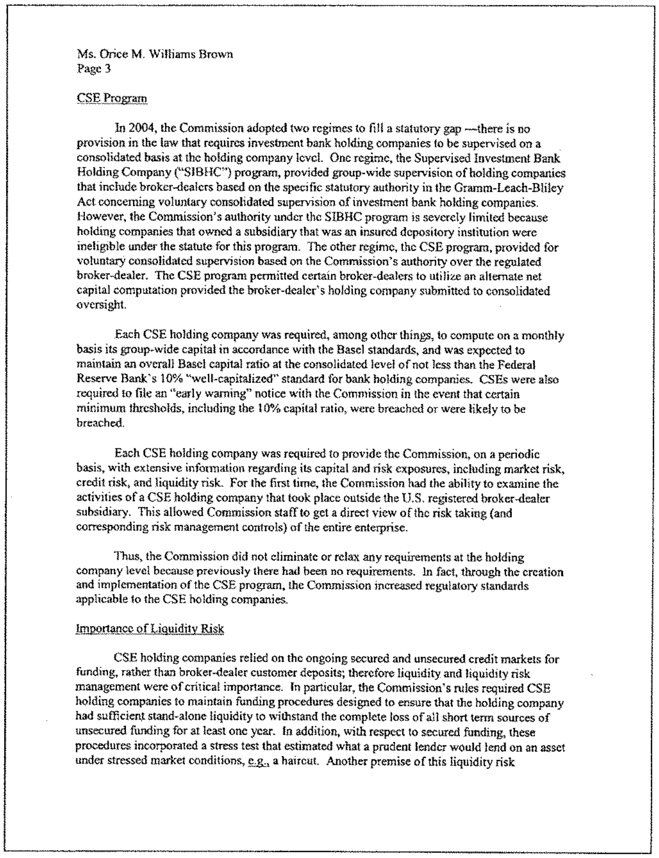
alternately, as having allowed broker-dealers to increase their leverage. Since August 2008, these commenters have suggested that the 2004 amendments removed a "12-to-1" leverage restriction that had prevented broker-dealers from taking on debt that exceeded more than twelve times their capital and, as a consequence, the Commission allowed these firms to increase their debt-to-capital ratios. These commenters point to the 2004 amendments as a significant factor leading to the demise of Bear Stearns. However, in fact, the 2004 amendments did not alter the leverage limits in the broker-dealer net capital rule.

The net capital rule requires a broker-dealer to undertake two calculations: (1) a computation of the minimum amount of net capital the broker-dealer must maintain; and (2) a computation of the actual amount of net capital held by the broker-dealer. The "12-to-1" restriction is part of the first computation, and it was not changed by the 2004 amendments. The greatest changes effected by the 2004 amendments were to the second computation of actual net capital.

Under the net capital rule, a broker-dealer calculates its actual net capital amount by starting with net worth computed according to generally accepted accounting principles and then adding to that amount qualifying subordinated loans. Next, the broker-dealer deducts from that amount illiquid assets such as fixed assets, goodwill, real estate, most unsecured receivables, and certain other assets. This leaves the broker-dealer with what is known as "tentative net capital," which generally consists of liquid securities positions and cash. A broker-dealer's tentative net capital represents the amount of liquid assets that exceed all liabilities of the broker-dealer. The final step in calculating net capital is to take percentage deductions (haircuts) from the securities positions. The percentage deductions are prescribed in the rule and are based on, among other things, the type of security, e.g., debt or equity, the type of issuer, e.g., US government or public company, the availability of a ready market to trade the security, and, if a debt security, the time to maturity and credit rating. The amount left after deducting the haircuts from the securities positions is the broker-dealer's net capital. This actual amount of net capital needs to be equal to or greater than the required minimum.

The 2004 amendments permitted the CSE broker-dealers to reduce the value of the securities positions (the last step in computing actual net capital) using statistical value-at-risk (VaR) models rather than the prescribed percentage deductions in the net capital rule. This is how commercial banks — under the Basel Accord — had been computing market risk charges for trading positions since 1997.

Because the CSE broker-dealers were permitted to use modeling techniques to compute market and credit risk deductions, the Commission imposed a requirement that they file an early warning notice if their tentative net capital fell below $5 billion. This became their effective minimum tentative net capital requirement. The $5 billion minimum amount was comparable to the amount of tentative net capital the broker dealers maintained prior to the 2004 amendments. The early warning requirement was designed to ensure that the use of models to compute haircuts would not substantially change the amount of tentative net capital actually maintained by the broker-dealers. The levels of tentative net capital in the broker-dealer subsidiaries remained relatively stable after they began operating under the 2004 amendments, and, in some cases, increased significantly.



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CSE Program

In 2004, the Commission adopted two regimes to fill a statutory gap —there is no provision in the law that requires investment bank holding companies to be supervised on a consolidated basis at the holding company level. One regime, the Supervised Investment Bank Holding Company ("SIBHC") program, provided group-wide supervision of holding companies that include broker-dealers based on the specific statutory authority in the Gramm-Leach-Bliley Act concerning voluntary consolidated supervision of investment bank holding companies. However, the Commission's authority under the SIBHC program is severely limited because holding companies that owned a subsidiary that was an insured depository institution were ineligible under the statute for this program. The other regime, the CSE program, provided for voluntary consolidated supervision based on the Commission's authority over the regulated broker-dealer. The CSE program permitted certain broker-dealers to utilize an alternate net capital computation provided the broker-dealer's holding company submitted to consolidated oversight.

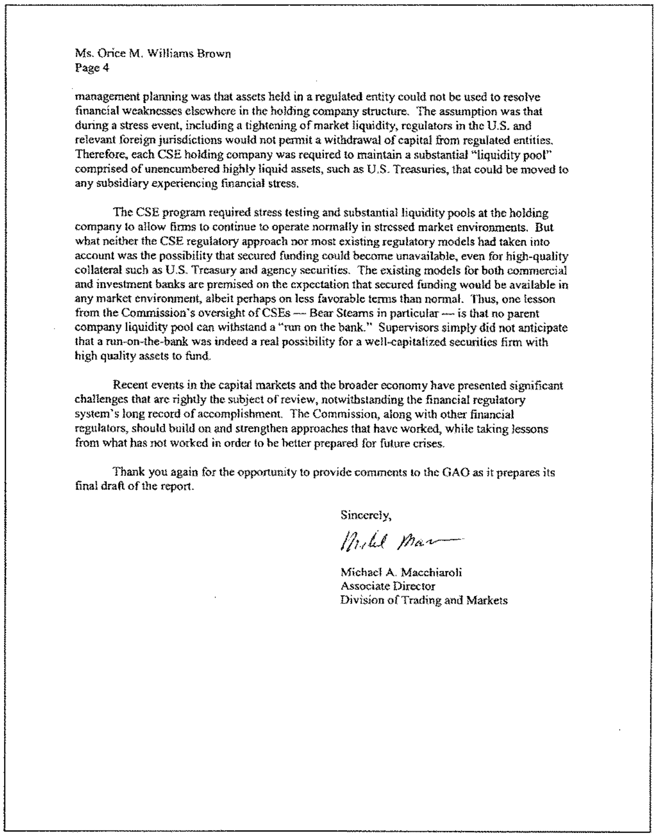
Each CSE holding company was required, among other things, to compute on a monthly basis its group-wide capital in accordance with the Basel standards, and was expected to maintain an overall Basel capital ratio at the consolidated level of not less than the Federal Reserve Bank's 10% "well-capitalized" standard for bank holding companies. CSEs were also required to file an "early warning" notice with the Commission in the event that certain minimum thresholds, including the 10% capital ratio, were breached or were likely to be breached.

Each CSE holding company was required to provide the Commission, on a periodic basis, with extensive information regarding its capital and risk exposures, including market risk, credit risk, and liquidity risk. For the first time, the Commission had the ability to examine the activities of a CSE holding company that took place outside the U.S. registered broker-dealer subsidiary. This allowed Commission staff to get a direct view of the risk taking (and corresponding risk management controls) of the entire enterprise.

Thus, the Commission did not eliminate or relax any requirements at the holding company level because previously there had been no requirements. In fact, through the creation and implementation of the CSE program, the Commission increased regulatory standards applicable to the CSE holding companies.

Importance of Liquidity Risk

CSE holding companies relied on the ongoing secured and unsecured credit markets for funding, rather than broker-dealer customer deposits; therefore liquidity and liquidity risk management were of critical importance. In particular, the Commission's rules required CSE holding companies to maintain funding procedures designed to ensure that the holding company had sufficient stand-alone liquidity to withstand the complete loss of all short term sources of unsecured funding for at least one year. In addition, with respect to secured funding, these procedures incorporated a stress test that estimated what a prudent lender would lend on an asset under stressed market conditions, e.g., a haircut. Another premise of this liquidity risk



Ms. Orice M. Williams Brown
Page 4

management planning was that assets held in a regulated entity could not be used to resolve financial weaknesses elsewhere in the holding company structure. The assumption was that during a stress event, including a tightening of market liquidity, regulators in the U.S. and relevant foreign jurisdictions would not permit a withdrawal of capital from regulated entities. Therefore, each CSE holding company was required to maintain a substantial "liquidity pool" comprised of unencumbered highly liquid assets, such as U.S. Treasuries, that could be moved to any subsidiary experiencing financial stress.

The CSE program required stress testing and substantial liquidity pools at the holding company to allow firms to continue to operate normally in stressed market environments. But what neither the CSE regulatory approach nor most existing regulatory models had taken into account was the possibility that secured funding could become unavailable, even for high-quality collateral such as U.S. Treasury and agency securities. The existing models for both commercial and investment banks are premised on the expectation that secured funding would be available in any market environment, albeit perhaps on less favorable terms than normal. Thus, one lesson from the Commission's oversight of CSEs — Bear Stearns in particular — is that no parent company liquidity pool can withstand a "run on the bank." Supervisors simply did not anticipate that a run-on-the-bank was indeed a real possibility for a well-capitalized securities firm with high quality assets to fund.

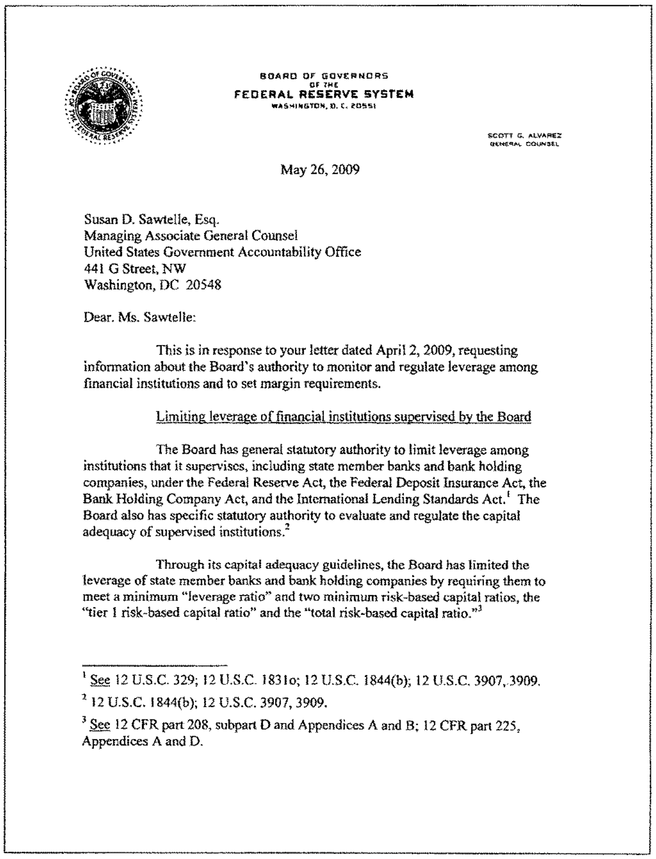
Recent events in the capital markets and the broader economy have presented significant challenges that are rightly the subject of review, notwithstanding the financial regulatory system's long record of accomplishment. The Commission, along with other financial regulators, should build on and strengthen approaches that have worked, while taking lessons from what has not worked in order to be better prepared for future crises.

Thank you again for the opportunity to provide comments to the GAO as it prepares its final draft of the report.

Sincerely,

Michael A. Macchiaroli
Associate Director
Division of Trading and Markets

Appendix IX: Letter from the Federal Reserve regarding Its Authority to Regulate Leverage and Set Margin Requirements



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D. C. 20551

SCOTT G. ALVAREZ
GENERAL COUNSEL

May 26, 2009

Susan D. Sawtelle, Esq.
Managing Associate General Counsel
United States Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear. Ms. Sawtelle:

This is in response to your letter dated April 2, 2009, requesting information about the Board's authority to monitor and regulate leverage among financial institutions and to set margin requirements.

Limiting leverage of financial institutions supervised by the Board

The Board has general statutory authority to limit leverage among institutions that it supervises, including state member banks and bank holding companies, under the Federal Reserve Act, the Federal Deposit Insurance Act, the Bank Holding Company Act, and the International Lending Standards Act.[1] The Board also has specific statutory authority to evaluate and regulate the capital adequacy of supervised institutions.[2]

Through its capital adequacy guidelines, the Board has limited the leverage of state member banks and bank holding companies by requiring them to meet a minimum "leverage ratio" and two minimum risk-based capital ratios, the "tier 1 risk-based capital ratio" and the "total risk-based capital ratio."[3]

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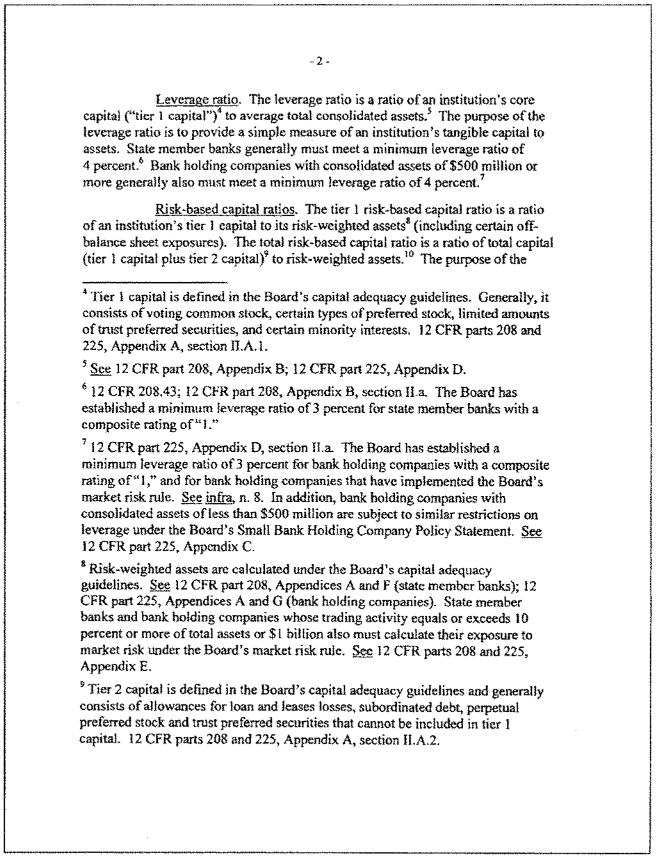
[1] See 12 U.S.C. 329; 12 U.S.C. 1831o; 12 U.S.C. 1844(b); 12 U.S.C. 3907, 3909.

[2] 12 U.S.C. 1844(b); 12 U.S.C. 3907, 3909.

[3] See 12 CFR part 208, subpart D and Appendices A and B; 12 CFR part 225, Appendices A and D.



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Leverage ratio. The leverage ratio is a ratio of an institution's core capital ("tier 1 capital")[4] to average total consolidated assets.[5] The purpose of the leverage ratio is to provide a simple measure of an institution's tangible capital to assets. State member banks generally must meet a minimum leverage ratio of 4 percent.[6] Bank holding companies with consolidated assets of $500 million or more generally also must meet a minimum leverage ratio of 4 percent.[7]

Risk-based capital ratios. The tier 1 risk-based capital ratio is a ratio of an institution's tier 1 capital to its risk-weighted assets[8] (including certain off-balance sheet exposures). The total risk-based capital ratio is a ratio of total capital (tier 1 capital plus tier 2 capital)[9] to risk-weighted assets.[10] The purpose of the

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[4] Tier 1 capital is defined in the Board's capital adequacy guidelines. Generally, it consists of voting common stock, certain types of preferred stock, limited amounts of trust preferred securities, and certain minority interests. 12 CFR parts 208 and 225, Appendix A, section II.A.1.

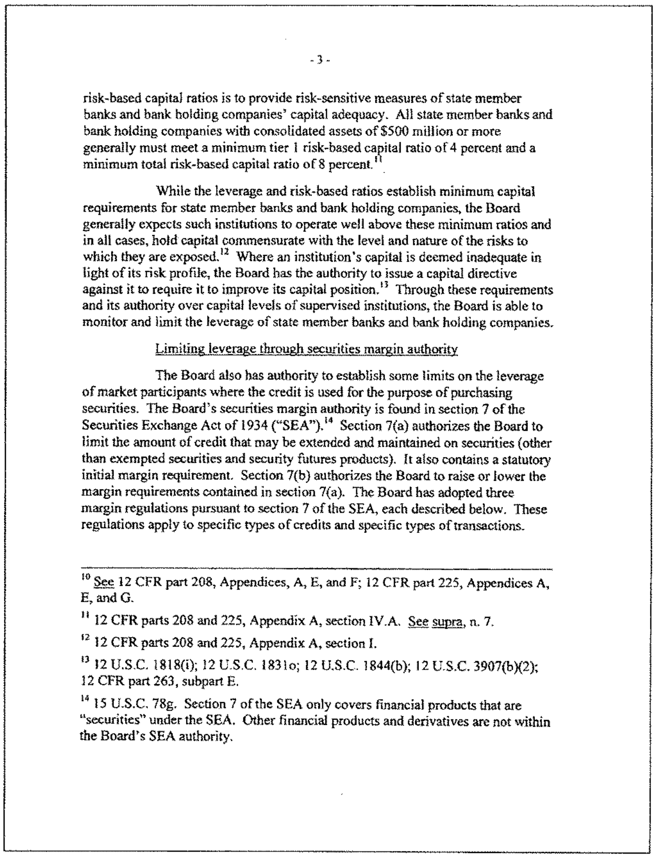
[5] See 12 CFR part 208, Appendix B; 12 CFR part 225, Appendix D.

[6] 12 CFR 208.43; 12 CFR part 208, Appendix B, section II.a. The Board has established a minimum leverage ratio of 3 percent for state member banks with a composite rating of "1."

[7] 12 CFR part 225, Appendix D, section II.a. The Board has established a minimum leverage ratio of 3 percent for bank holding companies with a composite rating of "1," and for bank holding companies that have implemented the Board's market risk rule. See infra, n. 8. In addition, bank holding companies with consolidated assets of less than $500 million are subject to similar restrictions on leverage under the Board's Small Bank Holding Company Policy Statement. See 12 CFR part 225, Appendix C.

[8] Risk-weighted assets are calculated under the Board's capital adequacy guidelines. See 12 CFR part 208, Appendices A and F (state member banks); 12 CFR part 225, Appendices A and G (bank holding companies). State member banks and bank holding companies whose trading activity equals or exceeds 10 percent or more of total assets or $1 billion also must calculate their exposure to market risk under the Board's market risk rule. See 12 CFR parts 208 and 225, Appendix E.

[9] Tier 2 capital is defined in the Board's capital adequacy guidelines and generally consists of allowances for loan and leases losses, subordinated debt, perpetual preferred stock and trust preferred securities that cannot be included in tier 1 capital. 12 CFR parts 208 and 225, Appendix A, section II.A.2.



risk-based capital ratios is to provide risk-sensitive measures of state member banks and bank holding companies' capital adequacy. All state member banks and bank holding companies with consolidated assets of $500 million or more generally must meet a minimum tier 1 risk-based capital ratio of 4 percent and a minimum total risk-based capital ratio of 8 percent.[11]

While the leverage and risk-based ratios establish minimum capital requirements for state member banks and bank holding companies, the Board generally expects such institutions to operate well above these minimum ratios and in all cases, hold capital commensurate with the level and nature of the risks to which they are exposed.[12] Where an institution's capital is deemed inadequate in light of its risk profile, the Board has the authority to issue a capital directive against it to require it to improve its capital position.[13] Through these requirements and its authority over capital levels of supervised institutions, the Board is able to monitor and limit the leverage of state member banks and bank holding companies.

Limiting leverage through securities margin authority

The Board also has authority to establish some limits on the leverage of market participants where the credit is used for the purpose of purchasing securities. The Board's securities margin authority is found in section 7 of the Securities Exchange Act of 1934 ("SEA").[14] Section 7(a) authorizes the Board to limit the amount of credit that may be extended and maintained on securities (other than exempted securities and security futures products). It also contains a statutory initial margin requirement. Section 7(b) authorizes the Board to raise or lower the margin requirements contained in section 7(a). The Board has adopted three margin regulations pursuant to section 7 of the SEA, each described below. These regulations apply to specific types of credits and specific types of transactions.

---

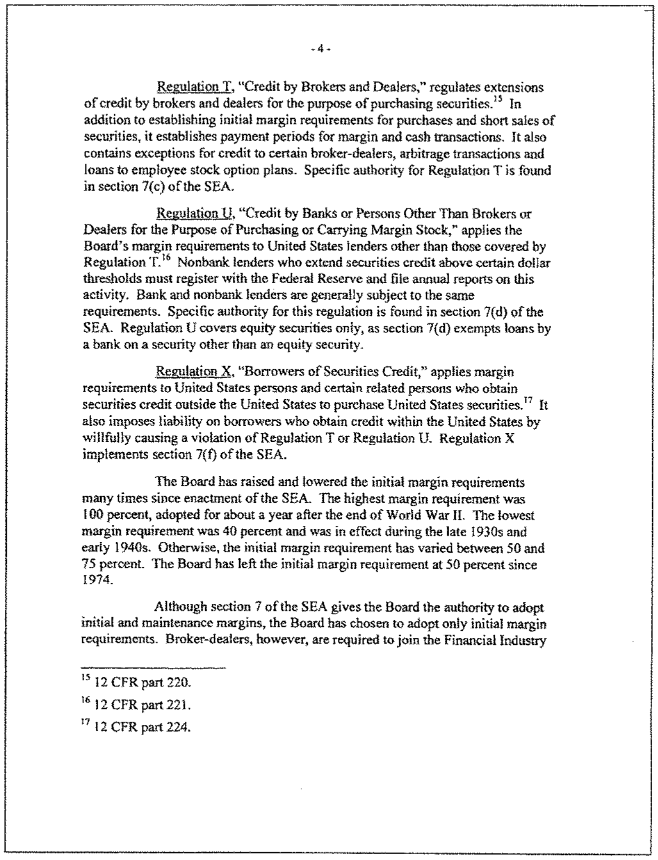
[10] See 12 CFR part 208, Appendices, A, E, and F; 12 CFR part 225, Appendices A, E, and G.

[11] 12 CFR parts 208 and 225, Appendix A, section IV.A. See supra, n. 7.

[12] 12 CFR parts 208 and 225, Appendix A, section I.

[13] 12 U.S.C. 1818(i); 12 U.S.C. 1831o; 12 U.S.C. 1844(b); 12 U.S.C. 3907(b)(2); 12 CFR part 263, subpart E.

[14] 15 U.S.C. 78g. Section 7 of the SEA only covers financial products that are "securities" under the SEA. Other financial products and derivatives are not within the Board's SEA authority.



Regulation T, "Credit by Brokers and Dealers," regulates extensions of credit by brokers and dealers for the purpose of purchasing securities.[15] In addition to establishing initial margin requirements for purchases and short sales of securities, it establishes payment periods for margin and cash transactions. It also contains exceptions for credit to certain broker-dealers, arbitrage transactions and loans to employee stock option plans. Specific authority for Regulation T is found in section 7(c) of the SEA.

Regulation U, "Credit by Banks or Persons Other Than Brokers or Dealers for the Purpose of Purchasing or Carrying Margin Stock," applies the Board's margin requirements to United States lenders other than those covered by Regulation T.[16] Nonbank lenders who extend securities credit above certain dollar thresholds must register with the Federal Reserve and file annual reports on this activity. Bank and nonbank lenders are generally subject to the same requirements. Specific authority for this regulation is found in section 7(d) of the SEA. Regulation U covers equity securities only, as section 7(d) exempts loans by a bank on a security other than an equity security.

Regulation X, "Borrowers of Securities Credit," applies margin requirements to United States persons and certain related persons who obtain securities credit outside the United States to purchase United States securities.[17] It also imposes liability on borrowers who obtain credit within the United States by willfully causing a violation of Regulation T or Regulation U. Regulation X implements section 7(f) of the SEA.

The Board has raised and lowered the initial margin requirements many times since enactment of the SEA. The highest margin requirement was 100 percent, adopted for about a year after the end of World War II. The lowest margin requirement was 40 percent and was in effect during the late 1930s and early 1940s. Otherwise, the initial margin requirement has varied between 50 and 75 percent. The Board has left the initial margin requirement at 50 percent since 1974.

Although section 7 of the SEA gives the Board the authority to adopt initial and maintenance margins, the Board has chosen to adopt only initial margin requirements. Broker-dealers, however, are required to join the Financial Industry

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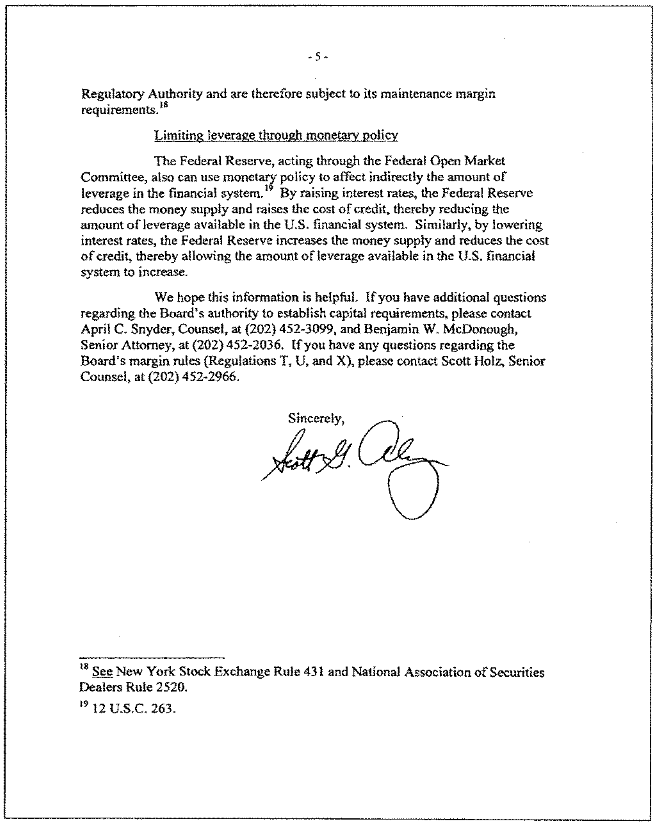
[15] 12 CFR part 220.

[16] 12 CFR part 221.

[17] 12 CFR part 224.



Regulatory Authority and are therefore subject to its maintenance margin requirements.[18]

Limiting leverage through monetary policy

The Federal Reserve, acting through the Federal Open Market Committee, also can use monetary policy to affect indirectly the amount of leverage in the financial system.[19] By raising interest rates, the Federal Reserve reduces the money supply and raises the cost of credit, thereby reducing the amount of leverage available in the U.S. financial system. Similarly, by lowering interest rates, the Federal Reserve increases the money supply and reduces the cost of credit, thereby allowing the amount of leverage available in the U.S. financial system to increase.

We hope this information is helpful. If you have additional questions regarding the Board's authority to establish capital requirements, please contact April C. Snyder, Counsel, at (202) 452-3099, and Benjamin W. McDonough, Senior Attorney, at (202) 452-2036. If you have any questions regarding the Board's margin rules (Regulations T, U, and X), please contact Scott Holz, Senior Counsel, at (202) 452-2966.

Sincerely,

Scott G. Al

---

[18] See New York Stock Exchange Rule 431 and National Association of Securities Dealers Rule 2520.

[19] 12 U.S.C. 263.

Appendix X: GAO Contact and Staff Acknowledgments

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In addition to the contacts named above, Karen Tremba (Assistant Director); Lawrence Evans, Jr.; John Fisher; Marc Molino; Timothy Mooney; Akiko Ohnuma; Linda Rego; Barbara Roesmann; John Treanor; and Richard Tsuhara made significant contributions to this report.

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January 2010

Debt and deleveraging: The global credit bubble and its economic consequences

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McKinsey Global Institute

January 2010

Debt and deleveraging: The global credit bubble and its economic consequences

Charles Roxburgh
Susan Lund
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Richard Dobbs
James Manyika

Preface

Debt and deleveraging: The global credit bubble and its economic consequences is the latest research by the McKinsey Global Institute (MGI) on the continuing financial crisis. In this report, we analyze in detail how debt and leverage have evolved in the public and private sectors in ten mature economies and four emerging economies. We also built an extensive database covering 45 episodes since 1930 in which an economy deleveraged, or significantly reduced its total debt-to-GDP ratio. With this database, we were able to identify four typical paths, or "archetypes," for the deleveraging process. This enabled us to analyze the macroeconomic channels for deleveraging and the economic consequences of the process in the past. Finally, we have identified the practical implications of our work for policy makers, financial regulators, and business executives.

This project was led by Charles Roxburgh, an MGI director, and Susan Lund, MGI director of research. The project team comprised the following MGI fellows: Tony Wimmer, Eric Amar, Charles Atkins, and Ju-Hon Kwek. Nell Henderson provided editorial support. The team also benefited from the contributions of Deadra Henderson, MGI operations specialist, and Rebeca Robboy, MGI external communications manager.

This report would not have been possible without the thoughtful input and expertise of numerous McKinsey colleagues around the world. These include Ignacio Abengoechea, Stephen Bear, Tab Bowers, Lowell Bryan, Kevin Buehler, Christian Casal, Dominic Casserley, Toos Daruvala, Ramon Forn, Philipp Härle, and Carlos Trascasa. We also benefited from numerous interviews with regulators, bank executives, and practitioners in the field. And we especially wish to thank our external academic advisers, Martin N. Baily, a senior adviser to McKinsey & Company and a senior fellow at the Brookings Institution, and Kenneth Rogoff, a professor of public policy and economics at Harvard University.

Our aspiration is to provide business leaders and policy makers around the world with a fact base to better understand the most important trends shaping global financial markets today. With this report, we hope to stimulate discussion and improve the chances of financial stability in the future.

Richard Dobbs Director Seoul	Charles Roxburgh Director London
James Manyika Director San Francisco	Susan Lund Director of Research Washington, DC

January 2010

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Executive summary

The recent bursting of the great global credit bubble not only led to the first worldwide recession since the 1930s, but also left an enormous burden of debt that now weighs on the prospects for recovery. Today, government and business leaders are facing the twin questions of how to prevent similar crises in the future and how to guide their economies through the looming and lengthy process of debt reduction, or deleveraging.

To help address these questions, the McKinsey Global Institute launched a research effort to understand the growth of debt and leverage before the crisis in different countries, the economic consequences of deleveraging, and the practical implications for policy makers, financial regulators, and business executives. In the course of the research, we created an extensive fact base on debt and leverage[1] in each sector of ten mature economies and four emerging economies.[2] In addition, we analyzed 45 historic episodes of deleveraging, in which an economy significantly reduced its total debt-to-GDP ratio, that have occurred since 1930.

This analysis adds new details to the picture of how leverage grew around the world before the crisis, and how the process of reducing it could unfold. We find that:

- Leverage levels are still very high in some sectors of several countries—and this is a global problem, not just a US one.
- To assess the sustainability of leverage, one must take a granular view using multiple sector-specific metrics. Our analysis has identified ten sectors within five economies that have a high likelihood of deleveraging.
- Empirically, a long period of deleveraging nearly always follows a major financial crisis.
- Historic deleveraging episodes have been painful, on average lasting six to seven years and reducing the ratio of debt to GDP by 25 percent. GDP typically contracts during the first several years and then recovers.
- If history is a guide, we would expect many years of debt reduction in specific sectors of some of the world's largest economies, and this process will exert a significant drag on GDP growth.

Our findings hold several important implications for policy makers, regulators, and business leaders as they seek to navigate these unprecedented economic conditions and ensure greater financial stability and prosperity for the future.

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[1] Throughout this paper, we use "debt" to refer to the outstanding amount of debt, comparing across countries by measuring it relative to GDP. "Leverage" refers to debt relative to assets or income and is measured differently, and often in multiple ways, for each sector. See *Appendix A: Technical notes* for more detail.

[2] The mature economies we examined are Canada, France, Germany, Italy, Japan, South Korea, Spain, Switzerland, the United Kingdom, and the United States. The emerging economies we examined are Brazil, China, India, and Russia.

as they substituted hybrid forms of capital for common equity. The crisis has shown, however, that common equity was the only form of capital that absorbed losses. Given the broad array of incentives for banks to substitute debt for equity, our analysis supports actions already taken by regulators to improve the quality of capital by raising the amount of common equity that banks must hold.[4]

DELEVERAGING HAS ONLY JUST BEGUN

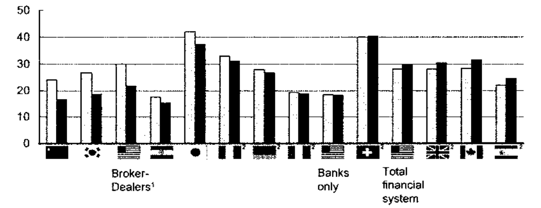
While the crisis abruptly halted the growth of credit in many economies, the process of deleveraging is just starting. As of the second quarter of 2009, we find that total debt relative to GDP had fallen, and only slightly, in just a handful of countries, including the United States, the United Kingdom, and South Korea. One reason for the small overall deleveraging to date has been the increase in government debt, which has offset declines in household sector debt. The current projections for rising government debt in some countries, such as the United Kingdom and the United States, may preclude any significant deleveraging of the total economy over the next few years.

Financial sector leverage, in contrast, has already fallen to the average historic levels prior to the crisis (Exhibit 2). We find that in most countries, by the second quarter of 2009, the banking system had deleveraged to the point at which capital levels were at or above the average levels of the 15 years preceding the crisis. Whether more capital is needed in addition to what banks have now accumulated remains unknown. And given the possibility of economy-wide deleveraging going forward, any such measures to boost capital requirements should be phased in very cautiously over time to minimize the reduction of credit provision.

Exhibit 2

Financial sector leverage has fallen below the historic average in most countries

Cross-country comparisons of financial sector leverage,
Tangible assets/tangible common equity



2009 vs. historic average %	-31	-30	-27	-13	-11	-6	-4	-2	-1	1	5	8	11	11

1 Includes Morgan Stanley, Goldman Sachs, and Merrill Lynch as of Q4 2008.
2 Leverage based on an estimate of GAAP assets (converted from IFRS).

SOURCE: SNL Financial; Compustat; Bloomberg; national financial regulators; McKinsey Global Institute

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[4] Regulators have proposed increasing the ratio of Core Tier 1 capital to risk-weighted assets. Core Tier 1 capital includes common stock, reserves created out of retained earnings or surpluses related to share issuance, and minority interest in consolidated subsidiaries.

GOING FORWARD, SPECIFIC SECTORS OF FIVE ECONOMIES HAVE THE HIGHEST LIKELIHOOD OF DELEVERAGING

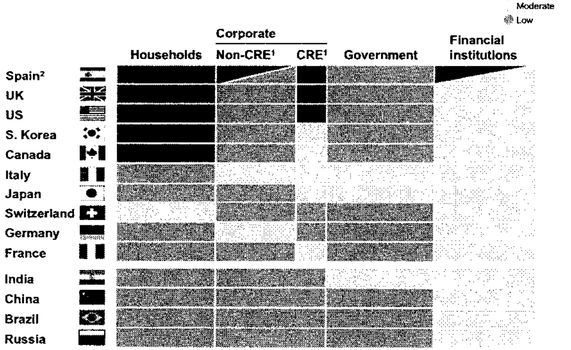
Our analysis finds that aggregate measures of leverage in an economy, such as the ratio of total debt to GDP, are in and of themselves not a reliable guide to the sustainability of debt or the likely speed or extent of deleveraging. Our historic case studies include economies that have gone through painful and significant deleveraging with relatively low debt-to-GDP levels, as well as countries that have maintained very high levels for many years. To assess the likelihood of deleveraging going forward, one needs to take a very granular approach and look at individual sectors. Even within sectors, one must use multiple lenses to assess the sustainability of debt, including the rate of growth of leverage, debt servicing capacity, and the borrowers' vulnerability to income interruptions or sharp increases in interest rates.

We have developed a set of such sector-specific metrics that are comparable across countries and constructed a preliminary "debt and deleveraging heat map" (Exhibit 3). It color codes each sector according to its likelihood of deleveraging: red is high; yellow is moderate; green is low. The map shows that ten sectors in five economies have the highest likelihood of deleveraging. These are the household sectors in five mature economies (the United Kingdom, the United States, Spain, and to a lesser extent Canada and South Korea), the commercial real estate sectors in three of these economies (the United Kingdom, the United States, and Spain), and the corporate sector and parts of the financial sector in Spain.[5] But the publicly available data are imperfect, inconsistent, and not sufficiently granular for robust policy making. A natural role for the institutions charged with maintaining national and international financial stability (such as the International Monetary Fund or Financial Stability Board) would be to develop and maintain this type of monitoring system and take it to the next level of detail.

Exhibit 3

In mid-2009, 10 sectors had a high likelihood of deleveraging

Deleveraging heat map as of Q2 2009



1 CRE = Commercial real estate subsector; includes public and private real estate investment vehicles.

2 A split box indicates some portion of a sector, not necessarily 50 percent.

SOURCE: McKinsey Global Institute

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[5] Spain's banks had not deleveraged as much as those in the United Kingdom, the United States, or Switzerland by the second quarter of 2009 because a higher proportion of loans are held on balance sheet and therefore not marked to market. There is a distinct difference, however, between Spain's largest banks and the smaller, regional ones: the latter have a high likelihood of deleveraging.

FINANCIAL CRISES ARE TYPICALLY FOLLOWED BY DELEVERAGING EPISODES THAT SLOW GDP GROWTH

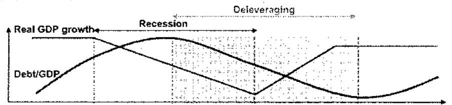
While we cannot say for certain that deleveraging will occur today, we do know empirically that deleveraging has followed nearly every major financial crisis in the past half-century. We find 45 episodes of deleveraging since the Great Depression in which the ratio of total debt relative to GDP declined, and 32 of them followed a financial crisis. These include some instances in which deleveraging occurred only in the public sector; others in which the private sector deleveraged; and some in which both the public and private sectors deleveraged simultaneously (*See Appendix B: Historical episodes of deleveraging*). The historic episodes of deleveraging fit into one of four archetypes: 1) austerity (or "belt-tightening"), in which credit growth lags behind GDP growth for many years; 2) massive defaults; 3) high inflation; or 4) growing out of debt through very rapid real GDP growth caused by a war effort, a "peace dividend" following war, or an oil boom.

The "belt-tightening" archetype was by far the most common of the four, accounting for roughly half of the deleveraging episodes. If today's economies were to follow this path, they would experience six to seven years of deleveraging, in which the debt-to-GDP ratio declines by around 25 percent. Deleveraging would begin two years after the start of the crisis, and GDP would contract for the first two to three years of deleveraging, and then start growing again (Exhibit 4).

Exhibit 4

Real GDP growth is significantly slower in the first 2-3 years of deleveraging

Impact of deleveraging on GDP growth



	10 years 10-year historic trend	1-2 years Economic downturn starts as economy still leverages up	2-3 years Downturn continues during the first years of deleveraging	4-5 years Economic "bounce-back" while deleveraging continues	10 years 10-year trend post-deleveraging
Average annual real GDP growth, %					
① **"Belt-tightening"** n = 16	4.7	0.6	-0.6	4.8	3.2
② **"High inflation"** n = 8	4.3	-1.7	-1.4	4.1	4.2
③ **"Massive default"** n = 7	4.3	-1.8	-3.0	5.7	4.8
④ **"Growing out of debt"** n = 1	7.9	0.8	← 12.8[1] →		2.3
Total n = 32	**4.6**	**-0.5**	**-1.3**	**5.1**	**3.8**

1 Deleveraging driven by off-trend growth is not linked to a recession.

SOURCE: International Monetary Fund; McKinsey Global Institute analysis

Several features of the crisis today, including its global nature and the large projected increases in government debt, could delay the start of deleveraging and result in a longer period of debt reduction than in the past. In past episodes, a significant increase in net exports often helped support GDP growth during deleveraging. But it is unlikely today that the most highly leveraged major economies could all simultaneously increase their net exports. Moreover, current projections of government debt in some countries, such as the United Kingdom, the United States, and Spain, may offset reductions in debt by households and commercial real estate sectors. We therefore see a risk that the mature economies may remain highly leveraged for a prolonged period, which would create a fragile and potentially unstable economic outlook over the next five to ten years. They may then go through many years in which, all else being equal, GDP growth is slower than it would have been otherwise as debt is paid down.

POLICY MAKERS CAN TAKE SEVERAL STEPS TOWARD PREVENTING FUTURE CREDIT BUBBLES

Our analysis has several implications for policy makers and regulators seeking to ease the deleveraging process and enhance future financial market stability.

First, history shows that policy makers can enable healthy deleveraging by supporting GDP growth through multiple channels. Many historic examples, from the United States in the 1930s to Japan in 1997, show the danger of withdrawing support of the economy too soon. However, faced with large increases in public debt, many governments face an acutely difficult decision on how long to provide support and when to curtail public spending.

Additionally, our analysis shows that the right tools could have identified the unsustainable buildup of leverage in pockets of several economies in the years leading up to the crisis. Policy makers should work toward developing a robust system for tracking leverage at a granular level across countries and over time. Ideally, an international body should be tasked with collecting the data from individual countries. These data can inform macroprudential policies, as well as provide inputs into the risk models of banks and nonfinancial corporations. A revised Basel II framework could require banks to adjust their internal risk weights to reflect levels of leverage in the relevant sector of the real economy. Central banks, too, could use this information: although it may be difficult to identify asset bubbles based on price movements, the growth and nature of leverage may serve as a good proxy and could inform monetary policy.

Finally, policy makers should revisit the numerous incentives for borrowing, especially in real estate markets. This includes tax breaks for mortgages, as the United States provides, and other policies as well, because we observed high levels of household debt in Canada and the United Kingdom, which lack such tax incentives. Many governments provide subsidies and other programs to encourage home ownership. And multiple policies provide tax advantages and other incentives that induce companies to issue debt rather than equity. Certainly, ample credit is needed for the growth of modern, developed economies. But excessive borrowing, especially combined with loose lending standards, can cause serious harm to individual households, companies, and the broader financial system. Therefore, as part of longer term reform of the global financial system, it would be valuable to reassess the incentives that may contribute to excessively high leverage.

Business executives also will face challenges during the deleveraging process. An environment of tighter and more costly credit will alter the viability of some business models and the attractiveness of certain types of investments. With the household sectors likely to deleverage in several countries, consumption will probably grow more slowly than before the crisis, causing spending patterns to shift. Business leaders will need flexibility to respond to such changes

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At this writing, the deleveraging process has barely begun. Each week brings news of another country straining under the burden of too much debt or impending bank losses from over-indebted companies. The bursting of the great global credit bubble is not over yet. Just as worrisome is the fact that deleveraging is likely to be a significant component of the postcrisis recovery, which would dampen growth. Nevertheless, by learning lessons from historic experiences of deleveraging, today's policy makers may be better able to steer a course through these challenging waters.

Debt and deleveraging: The global credit bubble and its economic consequences

As is by now well known, the levels of debt and leverage grew steadily in the world's developed economies for more than a decade before the global financial crisis, and this growth accelerated after 2000. Today, with asset prices falling and credit losses mounting, it appears we may be entering a period of debt reduction, or deleveraging, both of the overall economy and within those sectors that experienced the highest buildup of debt before the crisis. Going forward, government and business leaders face the questions of how to navigate through the difficult times ahead and how to prevent similar crises in the future.

To help address these questions, the McKinsey Global Institute launched a research project to understand the growth of debt and leverage before the crisis and the economic consequences of deleveraging. We find that leverage remains very high in at least ten sectors of five major economies—Canada, Spain, South Korea, the United States, and the United Kingdom. While we cannot say for certain whether these sectors will deleverage, we do know that nearly every significant financial crisis in the post-World War II period was followed by a lengthy and painful period of deleveraging. These episodes lasted on average six to seven years, with total debt as a percentage of GDP declining by roughly 25 percent. GDP contracted in the initial years of deleveraging but rebounded in the later years. If history is a guide, therefore, we would expect a significant period of deleveraging to come, which will dampen GDP growth.

This report is organized as follows: First, we assess the increases in debt and leverage in ten mature economies and four emerging economies[6]—breaking down that data by each country's financial, household, nonfinancial business, and government sectors. We then analyze the sustainability of current levels of leverage in those sectors and construct a "heat map of deleveraging." The map shows which sectors in which economies are most likely to deleverage. Third, we analyze 45 episodes of deleveraging since 1930, focusing on the 32 episodes that occurred after a financial crisis. From these episodes, we draw insights into the macroeconomic channels through which a country can deleverage. Finally, we discuss the policy and business implications of our findings. In the appendices, we provide more detail on seven historic episodes of deleveraging and technical notes on our methodology.

With this report, we hope to help policy makers, regulators, and business leaders as they steer a course through the complex process of deleveraging in the years to come and seek to improve financial stability in the future.

THE GREAT GLOBAL CREDIT BUBBLE

While most analyses of the crisis have focused on the roles played by the US subprime mortgage market and leverage in the financial sector, we find a much broader pattern in the growth of leverage across most mature economies. We also see that most of the growth in debt and leverage was not in the financial sector, but rather in the household, business, and some government sectors.

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[6] The mature economies we examined are Canada, France, Germany, Italy, Japan, South Korea, Spain, Switzerland, the United Kingdom, and the United States. The emerging economies we examined are Brazil, China, India, and Russia.

Borrowing accelerated in most developed countries

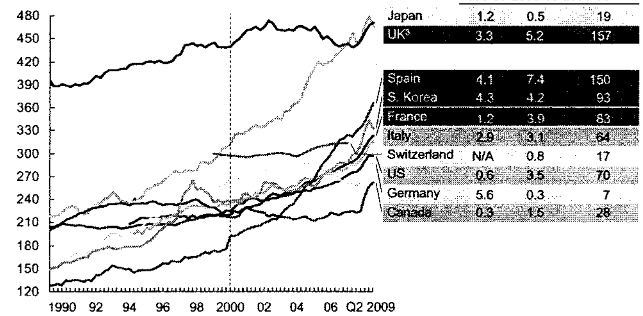
Total debt relative to GDP in the ten mature economies in our sample increased from about 200 percent of GDP in 1995 to over 300 percent by 2008. However, these countries' individual stories differ starkly, particularly since 2000 (Exhibit 5). The United Kingdom experienced the largest increase in total debt relative to GDP from 2000 through 2008, with its ratio reaching 469 percent. Even after adjusting for London's role as a global financial sector, the United Kingdom has the second-highest ratio of debt-to-GDP among major economies after Japan.[7] The next largest increases in debt relative to GDP occurred in Spain, South Korea, and France, while US debt to GDP grew more moderately.

Exhibit 5

Debt grew in most mature economies

■ Rapid growth
▨ Moderate growth
Slow/negative growth

Domestic private and public sector debt[1] by country
% of GDP



	CAGR[2], %		Change, p.p.
	1990-00	2000-08	2000-08
Japan	1.2	0.5	19
UK[3]	3.3	5.2	157
Spain	4.1	7.4	150
S. Korea	4.3	4.2	93
France	1.2	3.9	83
Italy	2.9	3.1	64
Switzerland	N/A	0.8	17
US	0.6	3.5	70
Germany	5.6	0.3	7
Canada	0.3	1.5	28

1 "Debt" is defined as all credit market borrowing, including loans and fixed-income securities.
2 Compound annual growth rate. Where data are unavailable, the longest possible period is used.
3 Even after removing foreign lending by UK banks, UK debt/GDP remains higher than every country's except Japan.

SOURCE: Central banks; Haver Analytics; McKinsey Global Institute

The exceptions to the pattern of rapidly rising total debt were Germany, Switzerland, Japan, and the emerging economies in our sample. Debt in the four emerging markets averaged 137 percent of GDP at the end of 2008, and it grew more slowly in the years before the crisis (Exhibit 6). If anything, these economies have room for more private sector borrowing to spur domestic consumption. The same might be said for Germany, where overall debt relative to GDP was flat from 2000 through 2008 and household debt to GDP actually declined, as we discuss below. Japan is a special case in which debt relative to GDP has remained very high, as private sector deleveraging has been offset by a growing government debt.

Within countries, the sectoral composition of debt and the importance of foreign lending vary widely, illustrating the importance of looking beyond aggregate measures of debt (Exhibit 7). Japan stands out with the largest amount of government debt. Households account for the largest share of total debt in the United

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[7] A similar adjustment would be required to account for the many large multinational corporations, such as in the United Kingdom and Spain, that take on debt to fund operations elsewhere. Unfortunately, reliable data for this exercise are not publicly available.

Small countries, big debts

Many countries beyond the 14 large ones in our sample increased their borrowing in the years prior to the crisis, amassing large debts relative to their GDP. For small economies—particularly those that tried to build international financial hubs—the results were dramatic.

In Iceland, an extraordinary credit boom took place after the country's banks were privatized in 2003 and were inadequately regulated. Total debt to GDP rose by more than 900 percentage points between 2000 and 2008, reaching an astonishing 1,189 percent. Iceland's financial sector debt alone reached 580 percent of GDP as Icelandic banks expanded rapidly, with the country's top three banks amassing assets worth more than 14 times GDP. Banks funded this expansion through the issuance of debt in international markets as well as through a surge in deposits from overseas investors drawn by Iceland's high interest rates from 2004 through 2008. Meanwhile, households and nonfinancial corporations also boosted borrowing, increasing their combined debt to GDP by 332 percentage points between 2000 and 2008.

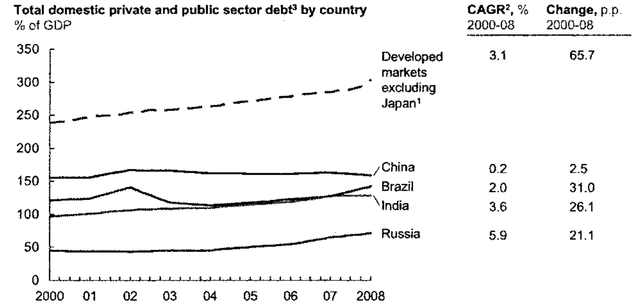
When the global financial crisis escalated in the fall of 2008, credit markets froze and wholesale bank funding—which accounted for half of Icelandic banks' liabilities—dried up, leaving them unable to roll over their short-term debts. Iceland's currency fell sharply. Asset prices collapsed. And the economy entered a severe recession, in which lower incomes rendered many borrowers insolvent and unable to service their debts. The scale of private sector borrowing in Iceland is unprecedented in the history of financial crises, and the economic effects of the financial crisis will be felt there for some time.

Ireland had a similar credit boom after 2001, when it actively sought to market itself as an international financial services hub. The Irish government offered tax incentives to attract foreign financial services firms and drew in large amounts of foreign capital. Ireland's total debt relative to GDP more than doubled from 2001 to 2008, to over 700 percent. Financial sector debt accounted for more than half of the total, at 421 percent of GDP. At the same time, the inflow of foreign capital fueled a property boom. By 2008, real estate accounted for 61 percent of Ireland's outstanding domestic credit. As with Iceland, the intensification of the financial crisis in late 2008 caused asset prices to fall steeply and plunged the economy into a deep recession. As in the larger, developed economies, the process of deleveraging the Irish economy may be prolonged and painful.

However, very high levels of aggregate debt are not the only indicator of the potential for financial distress. Even countries with relatively low levels of total debt can contain pockets of high leverage. As we write this report, another country, Greece, is in a situation in which mounting public sector debt poses a challenge for the government. The country's total economy debt level is not extraordinarily high at 230 percent of GDP. But investors have expressed concerns about the government's ability to manage its debt, which is equal to about 110 percent of GDP.

Exhibit 6

Emerging market debt levels are much lower than in mature markets

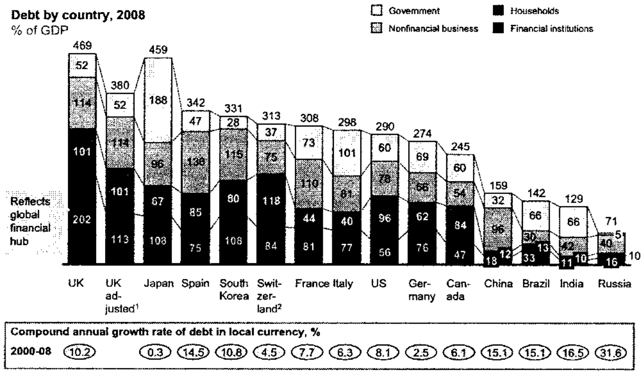


1 Includes Canada, France, Germany, Italy, S. Korea, Spain, Switzerland, the United Kingdom, and the United States; excludes Japan.
2 Compound annual growth rate.
3 "Debt" is defined as all credit market borrowing, including loans and fixed-income securities.

SOURCE: Central banks; Bank of International Settlements; Haver Analytics; McKinsey Global Institute

Exhibit 7

The sectoral composition of debt differs across economies



1 The UK financial sector was adjusted to reflect its position as a financial hub. See the technical appendix for details.
2 Data for Switzerland represent year-end 2007.

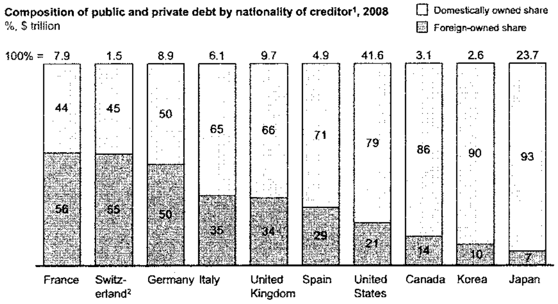
SOURCE: Haver Analytics; McKinsey Global Institute

States, Canada, and Switzerland, while nonfinancial businesses have the largest shares in South Korea and France. Foreign borrowing accounts for a larger share of the total in Europe, reflecting the integration of eurozone financial markets (Exhibit 8). These differences suggest that countries face different vulnerabilities going forward. Indeed, one major conclusion from our analysis is that overall measures of debt to GDP are a misleading guide. It is essential to take a more granular view and focus on debt levels within each sector of the economy. We therefore analyze leverage within each of the household, corporate, financial, and government sectors in the next section.

Exhibit 8

The share of external debt varies across countries

Composition of public and private debt by nationality of creditor[1], 2008
%, $ trillion



1 We calculate the percentage of foreign-owned debt by comparing the sum of foreign debt and loan liabilities, reported in the international investment position, with total debt calculated from national balance sheet accounts.
2 Switzerland represents year-end 2007 data.

SOURCE: Haver Analytics; McKinsey Global Institute Cross-Border Investments database; McKinsey Global Institute

The rise in debt occurred mainly in the real economy, and particularly in real estate

Policy makers and regulators have focused much attention on the growth in financial sector borrowing as a primary contributor to the crisis. Financial institutions increasingly issued debt—and particularly short-term debt—rather than rely on deposits to fund lending in the years before the crisis. This source of funding dried up when credit markets seized up in the fall of 2008, wreaking havoc in bank operations and contributing to the severity of the financial crisis.

However, across the mature economies, the increases in financial sector borrowing were dwarfed by the collective growth in the debt of households, corporations, and governments (Exhibit 9). Total debt increased by about $40 trillion from 2000 to 2008 in the mature markets we studied. Of that amount, financial institutions accounted for almost $11 trillion,[8] with the remaining $29 trillion divided roughly equally among households, nonfinancial businesses, and governments—the so-called real economy.

Real estate played an important role in the growth of leverage across countries.[9] Rising real estate prices were both a cause and a consequence of increased borrowing: as property prices rose, buyers borrowed more to purchase them, thereby pushing prices up even more. By 2007, bank lending for residential mortgages was equivalent to 81 percent of GDP in the United Kingdom and 73 percent in the United States (Exhibit 10).[10] In comparison, bank lending to businesses was equivalent to just 46 percent of GDP in the United Kingdom and 36 percent in the United States. In European countries, mortgage lending is lower.[11] But even there, mortgage lending across Western Europe accounted for the majority of *growth* in lending. In summary, the breadth of the housing bubble across many countries was perhaps greater than has been understood, and real estate leverage may warrant closer monitoring in the future.

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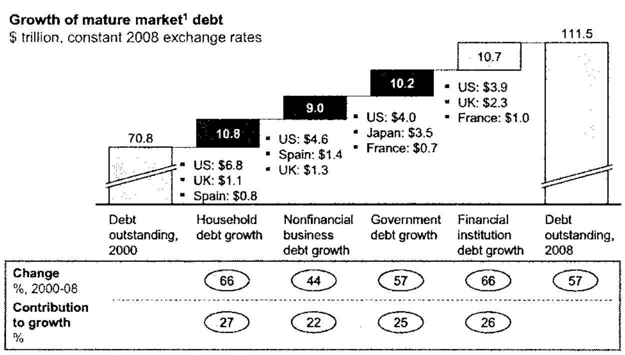
[8] Financial sector borrowing includes all debt—loans and debt securities—raised by deposit banks, other financial intermediaries, and insurance companies. Lending between deposit banks is netted out, but lending from deposit banks to other financial intermediaries is included. Unlike other reports (e.g., *The Turner Review: A regulatory response to the global banking crisis*, Financial Services Authority, March 2009), we exclude asset-backed securities in financial sector borrowing because the underlying collateral (e.g., mortgages) is counted in the sector of the respective borrower. *See Appendix A: Technical notes* for more detail.

[9] See *Global capital markets: Entering a new era*, McKinsey Global Institute, September 2009, available online at www.mckinsey.com/mgi.

Exhibit 9

Most of the growth in debt was not in the financial sector

Growth of mature market[1] debt
$ trillion, constant 2008 exchange rates



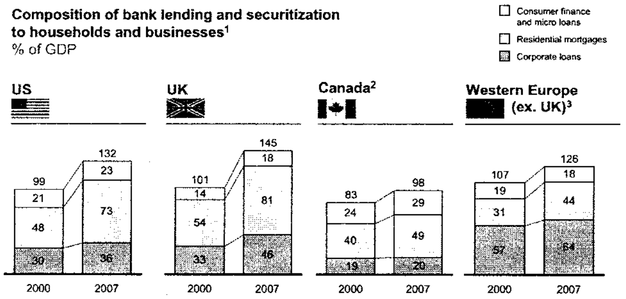
1 Countries included are Canada, France, Germany, Italy, Japan, S. Korea, Spain, Switzerland, the UK, and the United States.
Note: Including China would raise these numbers significantly. Over 2000-08, debt in China rose by $4.7 trillion and would have been in the top three countries in two sectors: nonfinancial business ($2.7 trillion) and government debt ($1.1 trillion).

SOURCE: McKinsey Global Institute

Exhibit 10

The growth in bank lending was concentrated in residential mortgages

Composition of bank lending and securitization to households and businesses[1]
% of GDP



1 We include consumer credit, residential mortgages (both securitized and on-balance sheet), corporate loans, and commercial mortgage loans. We exclude bonds, commercial paper, and foreign loans to nonfinancial business.
2 Canada's data include noncorporate business in the household sector.
3 Includes countries in the eurozone, Scandinavia, and Switzerland.

SOURCE: Central banks; Global Banking Profit Pools; McKinsey Global Institute

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[10] Residential mortgages include those that are both securitized and those held on-balance sheet.

[11] In Germany, for instance, lending to business is equivalent to 51 percent of GDP, while mortgage lending is only 35 percent.

DEBT AND LEVERAGE WITHIN THE HOUSEHOLD, BUSINESS, AND GOVERNMENT SECTORS

The aggregate measure of debt relative to GDP is not the only indicator of leverage. Within each sector, leverage needs to be assessed using different metrics, as we discuss later in the report. Using more granular measures of leverage, we find that households became significantly more leveraged in many countries, while most corporations and governments entered the crisis with stable or even declining levels of leverage. However, our analysis also shows that total debt is rarely spread evenly within sectors, and that average levels of sector leverage mask pockets of very highly leveraged borrowers. It was these borrowers in each sector that got into trouble and caused most of the credit losses in the crisis. This suggests a need for far more granular tracking of debt and leverage within the economy.

Household leverage increased significantly in many economies

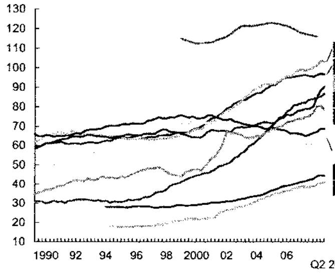
Households in almost all mature economies boosted their borrowing significantly relative to GDP since 2000. Although US household debt grew to 96 percent of GDP by 2008, UK and Swiss households had even larger amounts of debt, at 102 percent and 121 percent of GDP, respectively (Exhibit 11).[12] Canadian households also reached higher levels of debt to GDP in recent years. The exceptions were households in Germany and Japan, which had declining levels of debt relative to GDP.

Exhibit 11

Households in almost all countries increased their debt significantly relative to GDP

■ Rapid growth
▨ Moderate growth
Slow/negative growth

Total household debt³ by country
% of GDP



	CAGR², % 1990-00	CAGR², % 2000-08	Change, p.p. 2000-08
Switzerland	N/A	0.4	3
UK	0.5	5.0	32
US	1.2	4.2	27
Canada¹	0.5	3.6	20
Spain	4.1	8.3	40
S. Korea	2.6	6.6	32
Japan	1.2	-1.3	-7
Germany	4.1	-2.0	-11
France	0.6	5.3	15
Italy	4.4	7.8	18

1 Canada's data include nonfinancial noncorporate business.
2 Compound annual growth rate. Where data are unavailable, the longest possible period is used.
3 "Debt" is defined as all credit market borrowing, including loans and fixed-income securities.

SOURCE: Central banks; Bank of International Settlements; Haver Analytics; McKinsey Global Institute

Rising real estate prices and equity market indices masked the rise in household leverage, as the ratio of household debt to assets appeared stable in the years before the crisis. However, when leverage is measured as household debt relative to disposable income, we see large increases across most countries (Exhibit 12).

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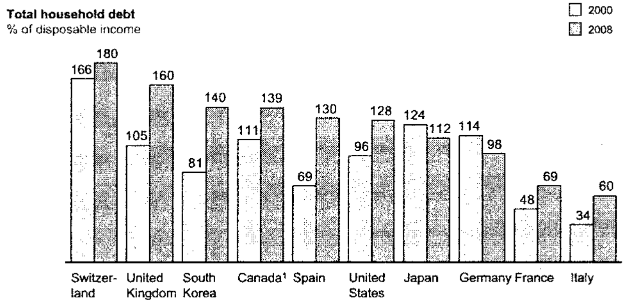
[12] The high indebtedness of Swiss households is a result of the domestic tax system. Both mortgage interest payments and maintenance costs are tax deductible. In addition, property taxes are assessed on notional rental value instead of market value. But the high level of indebtedness of Swiss households is sustainable for three reasons: high levels of household financial assets offset debt; the home ownership rate is very low (just 35 percent) and concentrated among wealthy households; and Swiss banks maintain strict underwriting standards with limits on both loan-to-value and interest payments-to-income ratios.

(Again, German and Japanese households, whose ratios declined, are exceptions). Despite low interest rates in the years leading up to the crisis, household debt service payments also increased as a percent of disposable income, although not by as much as the increase in the amount of debt. This illustrates the importance of assessing leverage through multiple lenses, because asset price appreciation can mask large and potentially unsustainable increases in leverage.

Exhibit 12

Household leverage measured as debt/income increased in most countries

Total household debt
% of disposable income



Increase %	9	52	73	25	88	33	-10	-14	44	76

1 Canada includes noncorporate business, which exaggerates its relative size compared to other countries.

SOURCE: Haver Analytics; McKinsey Global Institute

Within the household sector, there are some pockets of very highly leveraged borrowers. In the United States, contrary to conventional wisdom, the greatest increase in leverage occurred among middle-income households, not the poorest (Exhibit 13). Most borrowers who did not qualify for the prime mortgage category, in fact, were middle- and higher-income households with poor credit histories, or no down payments, or poor documentation of income—not low-income households buying a house for the first time.[13] In Spain, by contrast, leverage increased most among the poorer households.

We believe this type of highly granular analysis can help inform economic policy making, because deleveraging by the middle class is likely to take a very different path than deleveraging by the poorest segments of society. Lower-income households have little or no savings, so deleveraging of these households is most likely to occur through default, with very little impact on consumption but a high cost to the banking system (US data confirm that the lowest income households have the highest default rates, despite their lower leverage). Middle-income households have much lower default rates and instead deleverage by saving more and consuming less, a process that avoids credit losses but slows economic growth.

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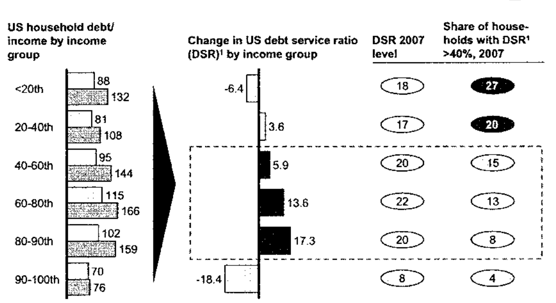
[13] The "subprime" designation refers to the borrower's creditworthiness, not income. The "Alt-A" designation refers to mortgages with a risk profile falling between prime and subprime. Data do not exist on subprime mortgage originations. We use data from the Federal Reserve, which approximates these mortgages by identifying loans with rates at least 1.5 percentage points higher than the applicable average prime rate offer. For the years in this analysis, this definition would not have included jumbo mortgages unless the borrower had a very low credit score.

Exhibit 13

In the United States, middle-income households saw the largest increase in debt/income and debt service payments
%



1 Ratio of household debt, interest, and principal payments to total income.

SOURCE: Haver Analytics; Federal Reserve; McKinsey Global Institute

The corporate sector entered the crisis with stable or declining levels of leverage, with two exceptions

Leverage ratios of nonfinancial businesses, measured as debt to book equity, were stable or declining in most countries in the years prior to the crisis as businesses enjoyed rising profits and booming equity markets (Exhibit 14).[14] However, two exceptions stand out—commercial real estate and companies acquired in recent years through leveraged buyouts.

The commercial real estate sector, with its preponderance of fixed assets, has traditionally employed more leverage than the rest of the corporate sector. This increased to even higher levels before the crisis as underwriting standards were relaxed, commercial property prices rose rapidly, and interest rates remained low. In the United States, for example, commercial real estate leverage, measured as debt to book equity, doubled from 1998 to 2008 (Exhibit 15). A large amount of these loans will need to be refinanced in coming years: in the United States, $1.3 trillion of commercial real estate loans will come due between 2010 and 2014.[15] Refinancing will be challenging if securitization markets remain anemic. Spain has a similar problem.

Rapid appreciation of commercial real estate prices, like residential real estate prices, has been at the heart of many financial crises. In their definitive study of financial crises, Kenneth Rogoff and Carmen Reinhart find a strong association between real estate booms and banking crises.[16] Several factors could account for this empirical regularity. First is the positive feedback between asset values and credit availability through mechanisms such as loan-to-value ratios. In addition, commercial real estate

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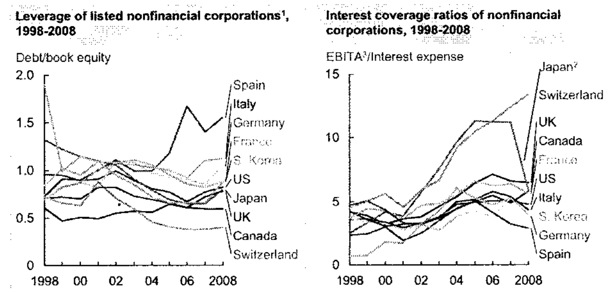
[14] We use a proprietary McKinsey database with financial statements of more than 50,000 publicly listed companies in countries around the world. It excludes smaller, privately owned businesses.

[15] In addition, roughly $1 trillion of US residential mortgages will have interest rates that reset during the period and may need to be refinanced.

[16] See Carmen Reinhart and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*, Princeton, NJ: Princeton University Press, 2009.

Exhibit 14

The nonfinancial corporate sector entered the crisis with lower leverage and improved interest coverage ratios in most countries



Leverage of listed nonfinancial corporations[1], 1998-2008

Interest coverage ratios of nonfinancial corporations, 1998-2008

[1] Even accounting for unfunded pension liabilities as debt, the leverage of most corporate sectors remains at reasonable levels (i.e. at or below 1x debt/book equity); Germany is the exception: unfunded liabilities representing 37 percent of shareholders' equity increase leverage to levels that are similar to the highly leveraged Spanish sector.

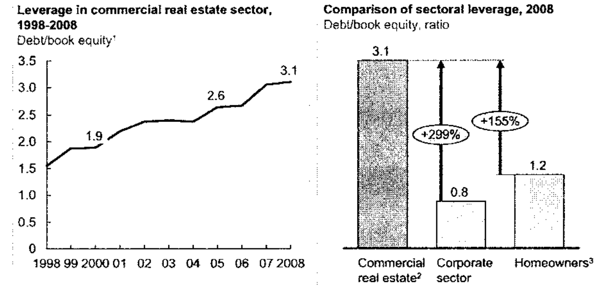
[2] Corporate profits in Japan fell by about 65 percent between Q1 07 and Q4 08 as the effects of the global downturn were amplified by an appreciating yen, high oil prices, and a fall in the value of equities held on corporate balance sheets.

[3] Earnings before interest, taxes, and amortization.

SOURCE: McKinsey Corporate Performance Analysis Tool; McKinsey Global Institute

Exhibit 15

Commercial real estate is a pocket of leverage within the US corporate sector



Leverage in commercial real estate sector, 1998-2008

Comparison of sectoral leverage, 2008

[1] Assets covered are nonowner-occupied institutional grade rental properties in major markets. Commercial real estate owned and occupied by corporations and lower quality/smaller rental properties in smaller markets are excluded.

[2] Includes publicly listed REIT segment, which is far more conservatively geared (debt/equity about 1.0). Excluding REITs, CRE leverage ratio would be about 3.8.

[3] Based on NBER's estimate of 55% average loan-to-value ratio for households in 2008.

SOURCE: National Bureau of Economic Research; Urban Land Institute; Federal Reserve Board; McKinsey Global Institute

lending takes place with only limited disclosure available on the businesses of real estate developers, most of which are private companies. Third, long lead times in real estate supply can result in big price shifts when there is a change in demand. Finally, real estate developers have an asymmetric payoff due to limited liability, with large potential profits if the project succeeds while losses in the case of default are borne by banks and other investors.

Companies bought through leveraged buyouts are another exception to the pattern of stable leverage in the overall corporate sector. As the private equity industry attracted new investors, the number and size of buyout deals rose, as did the leverage employed in the deals. In the United States, companies acquired through buyouts were 2.7 times as leveraged as the average publicly listed corporation in

2002—but were 4 times as leveraged near the peak of the bubble in 2005. Like commercial real estate, most of these loans will need to be refinanced in the next few years. Globally, some $1 trillion of syndicated loans that financed buyouts are due to mature between 2009 and 2014, of which $434 billion is in the United States. Given the impact of the recession on corporate revenue and the continued impairment of banks, many of these companies may be forced to reduce their debt burdens as loans come due, and they will most likely face much more restrictive covenants on their refinanced debt.

The government sector entered the crisis with steady levels of leverage

Most mature economies' government debt relative to GDP did not change much from 2000 through 2008. In the United States, for example, even with extra borrowing to pay for wars in Iraq and Afghanistan, strong economic growth during the period caused the ratio of government debt to GDP to fall by about 2 percent a year. Government debt relative to GDP also fell slightly in Italy, Spain, and Switzerland and rose slightly in Canada, France, Germany, and the United Kingdom. While governments could have done more to reduce debt during the boom years, it is fortunate that most entered the crisis with ample room to expand public spending, as they have since done.

FINANCIAL SECTOR LEVERAGE INCREASED SIGNIFICANTLY ONLY IN CERTAIN COUNTRIES

Looking first at debt, we see that since 2000, financial institutions' borrowing grew faster than GDP in all ten countries we studied, except Japan (Exhibit 16). The United Kingdom and Spain stand out for having the biggest increases in financial sector debt relative to GDP. These figures reflect the rapid growth of the financial sectors in those countries as well as a gradual shift by their banks away from relying on deposits to fund lending toward raising money by borrowing in the wholesale markets.

But despite the increase in financial sector *borrowing*, aggregate financial sector *leverage* in most countries—measured as the ratio of gross assets to equity—grew only modestly or declined in the years prior to the crisis (Exhibit 17). And in no country did it exceed previous historic[17] peaks (Exhibit 18). These observations also hold true after we adjust for some of the major cross-border differences in accounting that affect how bank assets are counted.[18] The relative stability of aggregate financial sector leverage in most countries despite large increases in lending to households and other borrowers is explained in part by two developments: first, the rise of securitization (which allowed banks to move loans off their balance sheets); and second, the financial sector's record profits in the years leading up to the crisis (which allowed institutions to add retained earnings to their equity base).

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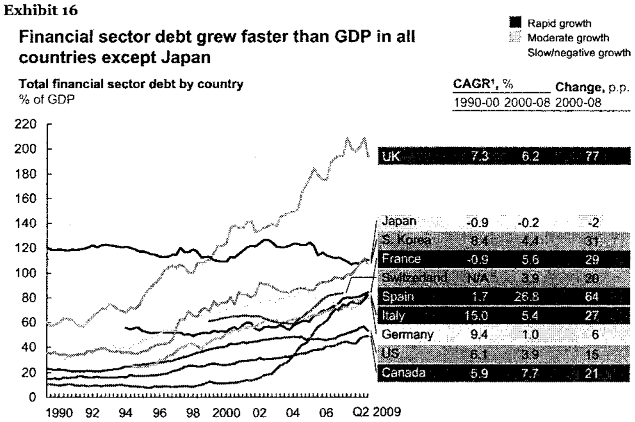
[17] We see little value in very long-term time series going back to the 19th century. Though of historical interest, we cannot see the relevance to modern policy making of capital ratios in 19th-century America when, in line with the Jacksonian vision, there was no central bank, no bank regulation, and a weak federal government. As a consequence, there were frequent financial crises. We focus on the period since 1990 for both theoretical and practical reasons: this period marks the takeoff of globalized financial markets and also offers a wider range of comprehensive data across countries (see *Appendix A: Technical notes* for long-term time series of US bank leverage ratios).

[18] We measure financial sector leverage by aggregating the balance sheets of major financial institutions, covering approximately 80 percent of the banking assets in each country. We correct for differences in treatment of assets between International Financial Reporting Standards (IFRS) and US Generally Accepted Accounting Principles (GAAP). See *Appendix A: Technical notes* for more detail on the data and methodology.

Exhibit 16

Financial sector debt grew faster than GDP in all countries except Japan

Total financial sector debt by country
% of GDP



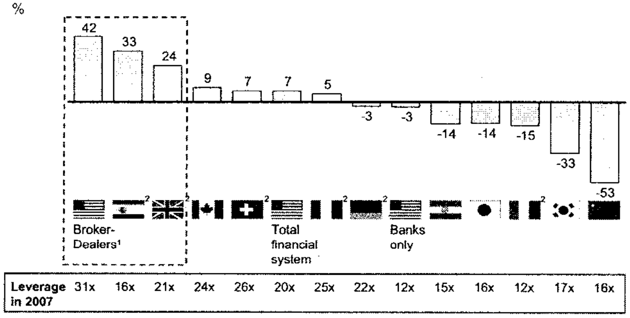
1 Compound annual growth rate. Where data are unavailable the longest possible period is used.

SOURCE: Central banks; Bank of International Settlements; Haver Analytics; McKinsey Global Institute

Exhibit 17

With a few important exceptions, financial institution leverage ratios were stable or falling before the crisis

Change in gross leverage (assets/equity) of financial institutions, 2002-07
%



1 Includes Morgan Stanley, Goldman Sachs, Merrill Lynch, Bear Stearns, Lehman Brothers.
2 Leverage is calculated based on an estimate of GAAP assets (converted from IFRS).

SOURCE: SNL Financial; Compustat; Bloomberg; national financial regulators; McKinsey Global Institute

The exceptions to this picture of moderate leverage were the large US broker-dealers,[19] plus in aggregate[20] the UK banks, Swiss banks, and parts of the US nonbank financial system such as the government-sponsored enterprises Fannie Mae and Freddie Mac (Exhibit 19). These institutions' leverage ratios increased by 25 percent or more in the years before the crisis. In addition, many of these institutions depended increasingly on short-term debt funding rather than deposits to fund

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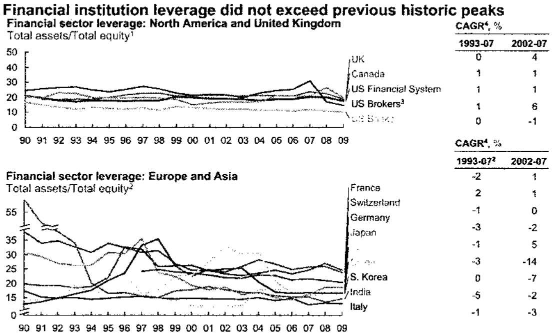
[19] Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, Morgan Stanley.

[20] The aggregate picture conceals wide variations at the level of individual institutions. We do not mean to imply that all UK or Swiss banks were highly leveraged, nor that all other banks remained conservatively leveraged.

Exhibit 18

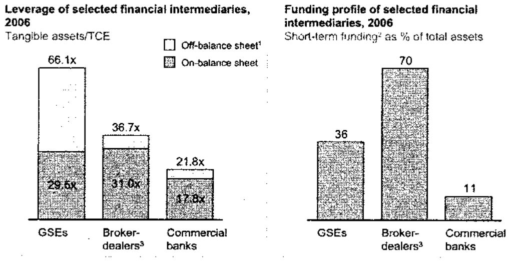
Financial institution leverage did not exceed previous historic peaks



1 For the UK, Spain, Germany, Switzerland and France, leverage based on an estimate of GAAP assets (converted from IFRS).
2 1996-2007 for China; 1997-2007 for Germany.
3 Includes Morgan Stanley, Goldman Sachs, and Merrill Lynch for 1990-2008; Bear Stearns, and Lehman Brothers for 1990-2007.
4 Compound annual growth rate.
SOURCE: SNL Financial; Compustat; Bloomberg; national financial regulators; McKinsey Global Institute

Exhibit 19

The US broker-dealers and government-sponsored enterprises (GSEs) were pockets of high leverage



1 Estimated based on size of relevant securitized asset-backed security (ABS) pools, private ABS pools allocated to private intermediaries by asset size.
2 Includes repos, capital markets funding, all other short-term borrowing (e.g. commercial paper), and current portion of long-term debt.
3 Weighted average for 5 large broker dealers: Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, Morgan Stanley.

SOURCE: SNL Financial; Federal Deposit Insurance Corporation; Securities Exchange Commission; McKinsey Global Institute

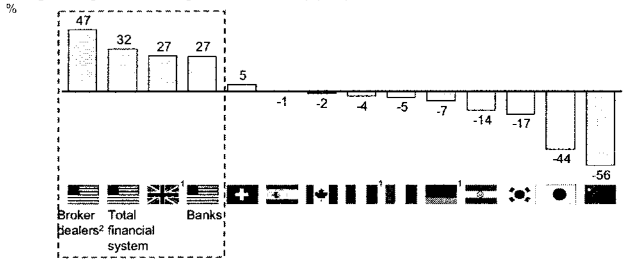
their activities. So high leverage levels left them particularly vulnerable when credit markets seized up during the worst of the crisis, and they were unable to roll over their short-term debt.

A second issue confirmed by our analysis is a gradual decline in the quality of capital within some large financial institutions, particularly in the United States and the United Kingdom, as they funded their asset growth with increasing amounts of hybrid capital instruments, such as certain forms of preferred stock. Although this was in line with existing regulatory frameworks and the Basel II international framework for bank capital, these hybrid capital instruments failed to absorb credit losses during the crisis and left the institutions vulnerable to failure.[21] When these hybrid forms are excluded from bank capital (along with the portions of equity attributable to intangible assets such as goodwill and deferred tax assets), the precrisis increases in financial sector leverage in some countries become more apparent. For example, leverage measured as tangible assets to tangible common equity increased by 27 percent in UK banks and by 47 percent in US broker dealers (Exhibit 20). This suggests that the quality of capital is more important than simplistic gross leverage ratios in enhancing financial sector stability (see sidebar, *Whatever Happened to Modigliani & Miller?*).

Exhibit 20

Leverage measured by common equity rose significantly in some institutions

Change in tangible assets/tangible common equity (TCE) of financial sectors, 2002-07



Leverage in 2007	38x	35x	36x	21x	47x	21x	28x	31x	19x	27x	16x	23x	33x	16x

1 For United Kingdom, Germany, Spain, Switzerland, and France, leverage is calculated based on an estimate of GAAP assets (converted from IFRS). Tangible Common Equity leverage ratios in the United Kingdom were especially elevated in 2007 due to crisis-related losses.

2 Includes Morgan Stanley, Goldman Sachs, Merrill Lynch, Bear Stearns, Lehman Brothers.

SOURCE: SNL Financial; Compustat; Bloomberg; national financial regulators; McKinsey Global Institute

SECTORS IN FIVE COUNTRIES ARE LIKELY TO DELEVERAGE

The crisis halted the buildup of debt in the mature economies, but the deleveraging process has barely begun. As of the second quarter of 2009, total debt to GDP had fallen, and only slightly, in just three major economies in our sample (South Korea, the United Kingdom, and the United States) (Exhibit 21). Looking at the economies by sector, we see that debt is just beginning to decline in the household and corporate sectors. However, government borrowing is increasing in some countries to finance crisis-related stimulus programs and financial sector bailouts. This rising government debt may preclude any significant reduction in total debt to GDP in the near term.

In contrast, the data show that financial institutions' leverage in most countries has already fallen below the averages that prevailed for 15 years before the crisis (Exhibit 22). This deleveraging has been associated with rapid declines in bank lending as banks have sought to slow the growth of (and in some cases even shrink) their balance sheets and as they have raised capital. Further deleveraging by the financial sector may result from changes in capital requirements, particularly the requirement that banks hold more common equity.

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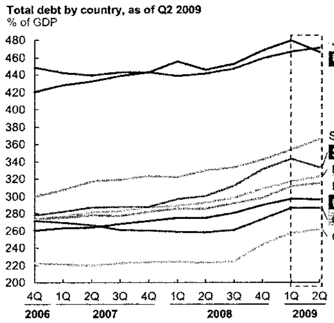
[21] Under rules set by the Basel framework and national regulators, certain forms of preferred stock can be included in Tier 1 and Tier 2 capital. Preferred stocks are a cheaper source of financing for banks, since they are less risky for investors, but they absorb losses only after all common equity has been wiped out. Interventions by the government in many banks have prevented losses from extended to preferred stock shareholders.

Exhibit 21

The deleveraging process has only just begun

■ Reduction in debt/GDP
▨ Stable debt/GDP
Increase in debt/GDP



Change, 1Q-2Q 2009

	% of GDP	p.p. of GDP	% of real credit
Japan	+0.9	+4.1	-2.0
UK	-2.9	-13.9	-3.6
Spain	+3.5	+12.4	+2.4
S. Korea	-3.0	-10.3	-0.1
France	+1.8	+5.9	+1.3
Italy	+1.2	+3.7	+1.1
US	-0.2	-0.6	-0.5
Germany	0.0	0.0	0.0
Canada	+1.8	+4.7	+0.8

SOURCE: Central banks; Bank of International Settlements; Haver Analytics; McKinsey Global Institute

Whatever Happened to Modigliani & Miller?

The deterioration of bank capital, with the substitution of debt and debt-like instruments for common equity, is at odds with the theorem—developed by Franco Modigliani and Merton Miller—that a corporation should be indifferent as to the mix of debt and equity in its capital structure.

It has long been recognized that the tax treatment of interest payments is a major factor increasing the attractiveness of debt over equity. However, tax advantages are not the only, or even major, reason that banks find debt instruments attractive. In the United States, banks have increased their use of debt funding despite falling tax rates. Since the 1960s, corporate tax rates have fallen by about a quarter while the banks' use of debt funding has tripled. If taxes were the only barrier to a world in which management were indifferent between debt and equity, falling tax rates ought to have resulted in reduced levels of debt as the value of the tax shield declined.

In addition to the tax benefits of debt, multiple factors create an incentive for management to minimize equity in the capital structure of a bank. These include management incentives (in which performance is judged by return on equity and earnings per share); explicit guarantees on deposits and implicit guarantees on debt for some large banks (which reduce the relative cost of non-equity funding); investor preferences (i.e., many pensions and insurance companies can hold highly rated debt but not equity); transaction costs (the costs of issuing new equity are relatively higher than issuing new debt or securing additional deposits); and the supply of equity capital (replacing the stock of financial sector debt with equity in the 14 countries we studied would require more than 60 percent of existing global equity capital).

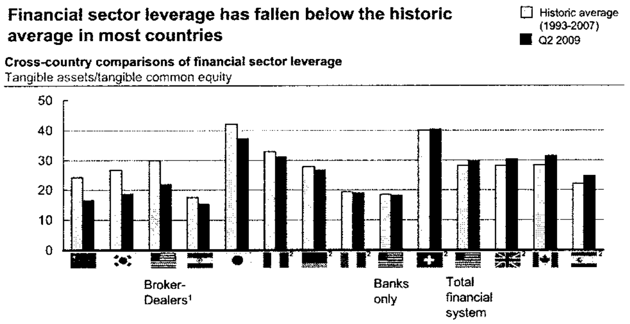
This leads us to the conclusion that the simplest and only effective policy tool to address the deterioration in the quality of capital is to mandate minimum levels of core capital (such as Core Tier 1 capital), as regulators in some countries have now done.

Exhibit 22

Financial sector leverage has fallen below the historic average in most countries

Cross-country comparisons of financial sector leverage

Tangible assets/tangible common equity



2009 vs. historic average %	-31	-30	-27	-13	-11	-6	-4	-2	-1	1	5	8	11	11

1 Includes Morgan Stanley, Goldman Sachs, and Merrill Lynch as of Q4 2008.

2 Leverage based on an estimate of GAAP assets (converted from IFRS).

SOURCE: SNL Financial; Compustat; Bloomberg; national financial regulators; McKinsey Global Institute

Multiple lenses are needed to assess the sustainability of leverage

The aggregate level of leverage in an economy is not a reliable guide to the likely speed or extent of deleveraging. Instead, one needs to look at individual sectors and through multiple lenses. To do this, we have developed a five-part framework to assess the sustainability of leverage for individual sectors of an economy.[22] The components are:

1. *Level of leverage*. High levels of leverage in a sector, compared with sectors in peer countries, is one indicator of unsustainability. However, for structural reasons, some economies may be able to sustain much higher levels of leverage than others, so this is not a strong indicator of sustainability if taken in isolation.

2. *Growth of leverage*. Significant increases in a sector's leverage, compared with historical trends or growth in peer countries, can indicate a higher risk of poor-quality assets coming onto the sector's balance sheet.

3. *Debt service capacity*. The ratio of interest and principal repayments to a borrower's income indicates the ability to make required debt payments. A higher ratio signals potential problems. In the corporate sector, an inverse metric, the "interest coverage ratio," is a standard measure.

4. *Vulnerability to income shocks*. Borrowers with highly variable income streams have a higher risk of default and therefore should not carry as much debt. However, a borrower's ability to draw down savings, reserves, or liquid assets can offset the risk of income declines and justify higher levels of sustainable debt.

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[22] Other proposals include a variety of metrics to assess the sustainability of leverage. For example, the recently published discussion paper by the Bank of England, "The role of macroprudential policy," proposes assessing a range of qualitative and quantitative metrics to determine the degree of "exuberance" in credit markets. Our framework has strong similarities, although we believe that a purely national view will be insufficient and that it will be critical to assess these metrics across as many countries as possible.

5. *Vulnerability to funding and interest rate shocks*. Borrowers with fixed-rate, long-term loans can sustain higher levels of debt because debt service payments do not vary. Borrowers with variable-rate loans, or short maturities, face greater interest rate risk, which limits the sustainable level of debt.

This framework yields specific metrics for each sector that together create a comprehensive view on the sustainability of leverage (Exhibit 23). For instance, for the household sector, we examine the level and change in the ratio of household debt to income; debt service payments as a percent of income; debt as a percent of financial assets; and the share of variable-rate debt in total debt.

Exhibit 23

We use a set of granular metrics to assess the likelihood of deleveraging

	Households	Corporates	Financial institutions	Governments
Absolute level of leverage	▪ Debt/income	▪ Debt/equity (book value)	▪ Tangible Assets (TA)/ Tangible Common Equity (TCE)	▪ Gross debt/GDP
Growth of debt and leverage	▪ CAGR[1] for debt/income	▪ CAGR[1] for debt/equity	▪ CAGR[1] for loans outstanding ▪ Variance of TA/TCE from 15-year average	▪ CAGR[1] for debt/GDP
Debt service capacity	▪ Debt interest payments over disposable income	▪ Interest coverage ratio (EBITA[2]/interest)	▪ N/A	▪ Interest/tax revenue
Vulnerability to income shocks	▪ Debt as percent of financial assets ▪ Variable rate mortgage percent of total	▪ Excess cash as percent of total assets	▪ Liquid assets as percent of total assets	▪ Net debt/GDP
Vulnerability to funding shocks		▪ Short-term debt as percent total debt	▪ Short-term wholesale funding as percent of assets ▪ Loans/deposits	▪ Foreign-owned debt/total debt

[1] Compound annual growth rate.
[2] Earnings before interest, taxes, and amortization.

SOURCE: McKinsey Global Institute

The data exist to use this framework reliably only at the broad sector level (households, financial institutions, government, corporate sector). We have attempted a further breakout to highlight the commercial real estate sector, for a total of five sectors in each country. Ideally, if the data could be obtained, we would want to refine this approach further by looking more closely at numerous subsectors and different types of debt to detect dangerous pockets of leverage. For example, in the household sector, it would be useful to distinguish between secured and unsecured debt. In financial institutions , it would be helpful to distinguish banks from nonbanks and to assess the variability of earnings. In the corporate sector, one would want to adjust for the different industry mix within countries. At present, the data available from national statistics are not sufficiently granular for this level of analysis. But even the aggregate sector assessment reveals interesting results.

Ten sectors in five countries have the highest likelihood of deleveraging

Assessing these five sector-specific metrics together reveals which sectors have the highest likelihood of deleveraging.[23] Based on data availability, our assessments present a view as of the second quarter of 2009.

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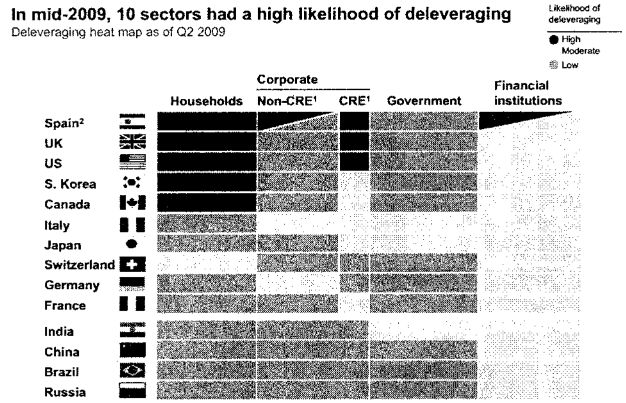
[23] See *Appendix A: Technical notes* for more detail on the methodology.

The resulting "heat map" in Exhibit 24 shows that ten sectors in five countries have a high likelihood of deleveraging (color-coded red or partially red) in the years ahead.[24] Of these, five are household sectors (the United Kingdom, United States, Spain, and to a lesser extent Canada and South Korea); three are commercial real estate sectors (the United Kingdom, United States, and Spain); one comprises parts of Spain's financial sector (especially the smaller banks); and one comprises the construction and real estate-related parts of Spain's corporate sector excluding commercial real estate.

Exhibit 24

In mid-2009, 10 sectors had a high likelihood of deleveraging

Deleveraging heat map as of Q2 2009



1 CRE = Commercial real estate subsector; includes public and private real estate investment vehicles.

2 A split box indicates some portion of a sector, not necessarily 50 percent.

SOURCE: McKinsey Global Institute

Households have a high likelihood of deleveraging in five countries. It is not clear what the "right" level of household leverage is for any country. It could change over time because of economic development and demographic shifts, and it may vary across countries depending on land availability and housing preferences. However, we can say today that household leverage (measured as the ratio of debt to disposable income) in the United States, United Kingdom, Spain, Canada, and South Korea is at historic peaks and has increased dramatically since 2000 (for instance, by 88 percent in Spain and 73 percent in South Korea). In South Korea, Spain, and the United Kingdom, more than 90 percent of household debt has variable rates, leaving borrowers exposed to future interest rate movements. We therefore classify these households as having a high likelihood of deleveraging. Households in some of these countries have already started to reduce debt, but have a long way to go.[25]

The commercial real estate sectors look ripe for deleveraging in three countries. In Spain, the United Kingdom, and the United States, leverage in the commercial real estate sector increased in the years before the crisis as rising real estate prices buoyed the apparent value of the collateral used to secure bank loans and as the expansion of the market for commercial mortgage-backed securities increased the supply of available funds. The rapid fall in commercial real estate prices during the crisis has reversed this dynamic. For example, delinquency rates on US commercial real estate loans have almost doubled from precrisis levels. In addition, commercial mortgage-backed securities maturing in 2010 through 2012 are highly concentrated in five-year interest-only loans originated from 2005 through 2007. Finding new lenders to replace these maturing securities might be highly challenging for the borrowers, potentially resulting in further defaults and deleveraging of the sector.

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[24] A split box indicates that some portion of the sector is color-coded a certain way, but not necessarily 50 percent.

[25] Some governments are also taking steps to slow household borrowing. The South Korean government, for instance, has instituted regulatory controls to slow growth in mortgage loans.

The financial sectors in all countries face a moderate likelihood of further deleveraging. The reasons in each country differ. For some, such as the United Kingdom, high reliance on short-term wholesale funding may prompt further deleveraging. In other countries, such as the United States, deteriorating commercial real estate assets will force some banks to raise more capital or reduce lending. And banks in all countries could be affected by regulatory changes that increase capital ratios.

Spain's private sector leverage overall has increased. With the creation of the euro in 1999, Spain went from having high and volatile interest rates to much lower, more stable interest rates. This change increased the demand for credit, much of it for real estate. As a result, real estate and construction are now a large part of Spain's economy. As of 2008, the Spanish construction industry accounted for 11 percent of GDP (compared with 5.4 percent in the United States). In Spain, 60 percent of domestic lending was related to real estate (compared with 53 percent in the United States). Now the collapse of the real estate bubble is affecting not just household borrowers but also the financial institutions, construction-related industries, and other businesses that prospered and borrowed heavily during the expansion.

Spain's corporate sector overall has a markedly higher leverage ratio (measured as debt to book equity) than that in other countries and it has increased significantly since 2000. However, this aggregate figure includes some very highly leveraged construction companies. It may also reflect the industry mix in Spain, which has more large, global companies in industries that are typically more highly leveraged. We therefore split our assessment into red for the construction and real estate-related companies and green for the remainder.

For Spain's financial sector, we recognize a marked divergence in the position of the larger Spanish banks compared with the smaller, regional ones.[26] Going forward, the deflating Spanish real estate bubble is likely to affect most heavily the small and medium-size savings banks (the *cajas*), which have a larger proportion of their balance sheets exposed to domestic real estate and which have experienced significantly higher rates of nonperforming loans than larger banks. Large Spanish banks such as Santander and BBVA are not in a materially different position than other global banks, given the international diversity of their assets and their strong capital ratios. We therefore rate the Spanish financial sector in the heat map as yellow for the larger banks but red for the smaller banks, which have a higher likelihood to deleverage going forward. We also recognize that given widespread capital raising by the banks after the second quarter of 2009, the financial institutions sector might now be further down the path of deleveraging.

Developed economy governments appear unlikely to deleverage anytime soon. With the exception of Japan, governments in the mature economies entered the crisis with stable debt burdens and declining debt service payments. We characterize the governments of Japan and Italy as having a moderate likelihood of deleveraging.

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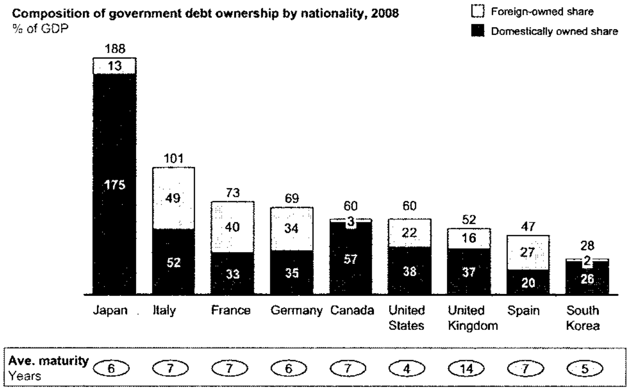
[26] It's worth noting that the Spanish banks had, and still have, relatively low levels of leverage.

Japan's government debt, although very large, is offset by high levels of financial assets[27] and is amply funded by domestic household savings (Exhibit 25). Italy's government debt is high, but nowhere near Japan's level, and its debt service capacity is near the median of other countries in our sample.[28] For the other mature economies, there is little likelihood of government deleveraging in the near future. The government debt-to-GDP ratios in many mature economies are projected to rise over the next two to three years, which may well put them into the yellow or red categories, at which point they will likely start to deleverage.[29]

Exhibit 25

Japan's government debt is mostly owned by domestic investors



SOURCE: Bank of International Settlements; International Monetary Fund; central banks; McKinsey Global Institute

Emerging markets are unlikely to deleverage. In the four emerging-market economies we examined, no sector appears highly likely to deleverage. In most sectors, leverage is far below that of developed economies because of conservative borrowing practices and limited access to credit (government debt in India and Brazil are the exceptions). Nonetheless, the very rapid growth in credit in the first half of 2009 in both China and India could indicate trouble ahead in the quality of loan portfolios. There is a strong historical correlation between past rates of loan growth and future nonperforming loans, as credit underwriting standards slip when new volumes are very high.[30]

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[27] In both South Korea and Japan, government debt is significantly offset by government assets. If we subtract intra-government debt holdings, central bank holdings of government debt, and foreign reserves, we find Japan's net government debt is 142 percent of GDP and South Korea's becomes less than zero. For all other countries in our sample, the difference is less than 10 percentage points.

[28] Italy's current debt service consumes 11 percent of tax revenue, compared with 22 percent for Japan. The figures for the United States and the United Kingdom, in contrast, are 9 percent and 6 percent, respectively.

[29] Global Insight projects that by the end of 2012, US government debt will reach 105 percent of GDP, UK debt will reach 91 percent, Spain's will rise to 74 percent, Japan's will reach 225 percent, and Italy's will reach 119 percent.

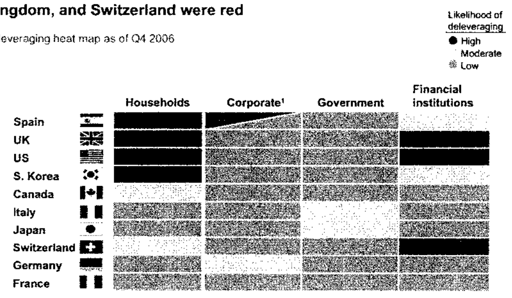
[30] See Dominic Barton, Roberto Newell, and Gregory Wilson, *Dangerous Markets: Managing in Financial Crises.*

The heat map in 2006 would have shown financial sectors in the United States, the United Kingdom, and Switzerland coded red. To test our methodology, we created a similar heat map for 2006 to see how effectively the tool would have been in spotting emerging pockets of leverage. While not definitive in proving the robustness of this framework, it showed that by 2006 households in Spain, South Korea, the United Kingdom, and the United States already had potentially unsustainable levels of leverage (Exhibit 26). Canadian households in 2006, in contrast, were not yet as leveraged. In the financial sector, the heat map shows that Switzerland, the United Kingdom, and the United States were "flashing red" in the run-up to the crisis. Their yellow coding as of the second quarter of 2009 reflects their significant deleveraging since the start of the crisis. The Spanish banking sector was coded yellow in 2006, reflecting that its aggregate leverage ratio was below its historic average. The rapid deterioration of Spain's real estate-related assets became apparent in 2007 and 2008.

Exhibit 26

At the end of 2006, the financial sectors in the United States, the United Kingdom, and Switzerland were red

Deleveraging heat map as of Q4 2006



1 Excludes commercial real estate subsector.

SOURCE: McKinsey Global Institute

THE SOBERING LESSONS FROM PAST EPISODES OF DELEVERAGING

We cannot say with certainty that the most highly leveraged sectors today will necessarily reduce their debt because many factors are at play, including economic, policy, and behavioral factors. However, we do know that deleveraging has followed nearly every major financial crisis in the post-World War II period. If history is a guide, certain sectors in these economies are therefore likely to go through a painful process in which the ratio of debt relative to GDP falls over many years. And while the world's major mature economies are expanding once again, deleveraging may present a drag on GDP growth rates for some time.

We arrived at this conclusion after creating a detailed database of deleveraging events since 1950. We augmented this with additional case studies from the United States during and after the Great Depression (1929-43). The result was 45 episodes of deleveraging, 32 of which followed a financial crisis (see *Appendix B: Historic episodes of deleveraging* for more detail on these episodes). This historical record offers several lessons, and some guide to what may lie ahead.

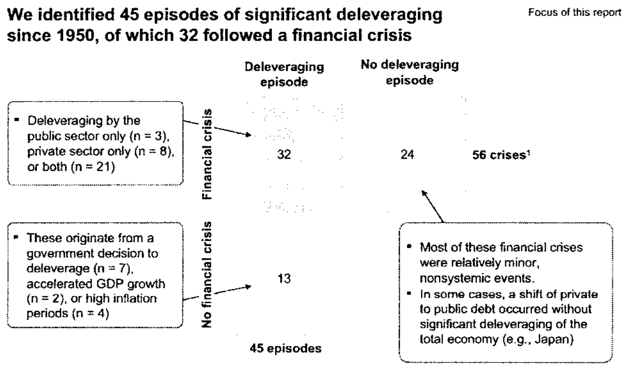
Deleveraging nearly always follows a financial crisis

We define a significant deleveraging episode as one in which the ratio of total debt to GDP declines for at least three consecutive years and falls by 10 percent or more. We identified 45 such episodes since 1930, ranging from the US Great Depression (1929–43) to Argentina today (2002–present). In some cases, deleveraging was accomplished primarily by the government, in others primarily by the private sector, and in some by both.[31]

We then cross-referenced these deleveraging episodes with the set of financial crises documented by economists Carmen Reinhart and Kenneth Rogoff.[32] We found that with only one exception (Japan), every *major* financial crisis during the period studied has been followed by a period of deleveraging (Exhibit 27).[33] It therefore appears likely that some sectors in the United Kingdom, United States, Spain, Canada, and South Korea will eventually go through a period of deleveraging.

Exhibit 27

We identified 45 episodes of significant deleveraging since 1950, of which 32 followed a financial crisis


Focus of this report
Deleveraging episode
No deleveraging episode
Deleveraging by the public sector only (n = 3), private sector only (n = 8), or both (n = 21)
Financial crisis
32
24
56 crises¹
These originate from a government decision to deleverage (n = 7), accelerated GDP growth (n = 2), or high inflation periods (n = 4)
No financial crisis
13
45 episodes
Most of these financial crises were relatively minor, nonsystemic events.
In some cases, a shift of private to public debt occurred without significant deleveraging of the total economy (e.g., Japan)

1 Financial crises as identified by C. Reinhart and K. Rogoff.

SOURCE: C. Reinhart and K. Rogoff, *This Time is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

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[31] See *Appendix B: Historic episodes of deleveraging* for the full list of deleveraging episodes, as well as a detailed description of a selection of these episodes.

[32] Carmen Reinhart and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*, Princeton, NJ: Princeton University Press, 2009. Our work complements this work: Reinhart and Rogoff comprehensively analyze the history of financial crises, including patterns and crisis resolution. We focus on the patterns of debt reduction rather than the causes of crises. We also assess the current state of debt and leverage and of potential deleveraging going forward.

[33] Minor banking crises that do not result in a severe recession and are not systemic do not usually prompt deleveraging. That was the case, for example, in the US savings and loan crisis of the late 1980s and the Credit Lyonnais crisis in 1994 in France.

We also find that some deleveraging episodes do not follow a financial crisis. These can be the result of above-trend GDP growth in a postwar situation (e.g., Egypt 1975–79) or oil boom (e.g., Nigeria 1968–71); episodes that are due to periods of high inflation (e.g., Italy 1975–81); or simply government policy choices (e.g., Belgium in the years prior to joining the euro). We focus our analysis on the postcrisis deleveraging episodes because they are the most relevant to the situation today.

Four historic archetypes of deleveraging

Across the 32 episodes of postcrisis deleveraging, the most common path, fitting 16 of the episodes, was through a prolonged period of austerity, or "belt-tightening" (Exhibit 28). During this period, most countries experienced some growth in credit, but the pace was far below the precrisis rate of credit growth and was slower than nominal GDP growth. (In only a handful of severe cases did the stock of nominal debt actually decline). During these 16 episodes, the saving rate increased as borrowers slowly reduced their debt. Examples of deleveraging through belt-tightening include the US economy during the Depression years of 1933-37; Finland and other Scandinavian countries in the 1990s; and South Korea and Malaysia after the Asian financial crisis in 1997.

Exhibit 28

We have observed 4 archetypes of the deleveraging process

Archetype	Number of episodes after a crisis (total[1])	Description	Examples	Years
❶ **"Belt-tightening"** *Most common deleveraging path*	16 (23)	▪ Episodes where the rate of debt growth is slower than nominal GDP growth, or the nominal stock of debt declines	▪ Finland ▪ Malaysia ▪ US ▪ S. Korea	91-98 98-08 33-37 98-00
❷ **"High inflation"** *Absence of strong central banks, often in emerging markets*	8 (12)	▪ Periods of high inflation mechanically increase nominal GDP growth, thus reducing debt/GDP ratios	▪ Spain ▪ Italy ▪ Chile	76-80 75-87 84-91
❸ **"Massive default"** *Often after a currency crisis*	7 (7)	▪ Stock of debt decreases due to massive private and public sector defaults	▪ US ▪ Argentina ▪ Mexico	29-33 02-08 82-92
❹ **"Growing out of debt"** *Often after an oil or war boom*	1 (3)	▪ Economies experience rapid (and off-trend) real GDP growth and debt/GDP decreases	▪ US ▪ Nigeria ▪ Egypt	38-43 01-05 75-79

[1] Includes 13 deleveraging episodes that were not preceded by a financial crisis.

SOURCE: McKinsey Global Institute

We identified three other archetypes of deleveraging as well—"high inflation," "massive default," and "growing out of debt"—but they were relatively rare and occurred in conditions that are not present today in the mature economies. High inflation causes deleveraging by increasing nominal GDP growth, thereby reducing the ratio of debt over GDP. This pattern, which occurred in Chile from 1984 to 1991 and Spain from 1976 to 1980, typically reflects the absence of a strong and independent central bank. Massive defaults have usually followed currency crises, as in Argentina in 2002–08 and Mexico in 1982–92. And in just three cases in our sample were economies able to grow out of debt solely because of rapid economic expansions—and all three were fueled by war, such as the US experience during World War II, or oil booms. This record suggests that today's mature economies are most likely to deleverage through a belt-tightening process.

Deleveraging episodes last an average of six to seven years and are accompanied by a recession in the initial years

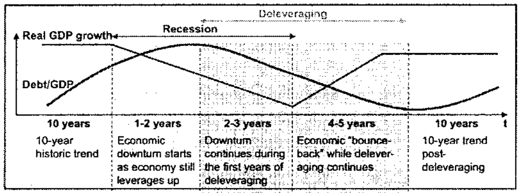
History shows that deleveraging is usually a long and difficult process. In the past, "belt-tightening" deleveraging episodes have lasted an average of six to seven years and reduced debt to GDP by about 25 percent (the median). Credit growth in most cases slows dramatically: in the mature economies in our sample, credit growth in the ten years prior to the crisis averaged 17 percent annually, but fell to just 4 percent during deleveraging.

The sharp reduction in credit growth has been associated with declining real GDP in the first two to three years of deleveraging (Exhibit 29). Interestingly, we find that deleveraging typically begins about two years after the start of the financial crisis and economic recession—just where the United States and Europe are as we write this report. In nearly every episode we examined, GDP growth declined in the early years of the process but then rebounded in the next four to five years while deleveraging continued. In the belt-tightening episodes, credit growth also resumed in the later years, although more slowly than GDP, allowing for further deleveraging.

Exhibit 29

Real GDP growth is significantly slower in the first 2-3 years of deleveraging

Impact of deleveraging on GDP growth


Deleveraging
Recession
Real GDP growth
Debt/GDP
t
10 years
10-year historic trend
1-2 years
Economic downturn starts as economy still leverages up
2-3 years
Downturn continues during the first years of deleveraging
4-5 years
Economic "bounce-back" while deleveraging continues
10 years
10-year trend post-deleveraging

Average annual real GDP growth, %	10 years	1-2 years	2-3 years	4-5 years	10 years
❶ "Belt-tightening" n = 16	4.7	0.6	-0.6	4.8	3.2
❷ "High inflation" n = 8	4.3	-1.7	-1.4	4.1	4.2
❸ "Massive default" n = 7	4.3	-1.8	-3.0	5.7	4.8
❹ "Growing out of debt" n = 1	7.9	0.8	12.8[1]		2.3
Total n = 32	**4.6**	**-0.5**	**-1.3**	**5.1**	**3.8**

1 Deleveraging driven by off-trend growth is not linked to a recession.

SOURCE: IMF; McKinsey Global Institute

DELEVERAGING CAN OCCUR THROUGH DIFFERENT MACROECONOMIC CHANNELS

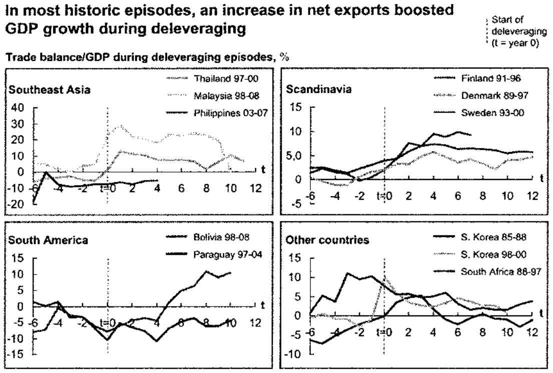
The historic episodes show that deleveraging can occur through different macroeconomic channels. These either reduce the growth of credit, increase nominal GDP growth, or both. Each archetype is associated with different channels. The "massive default" archetype results in deleveraging by reducing the outstanding stock of credit as loans are written down. The "high inflation" archetype works by increasing nominal GDP growth. The "growing out of debt" archetype works through a marked acceleration in real GDP growth, which historically has been the case only in war time or during commodity booms.

The most common "belt-tightening" archetype works by slowing credit growth and increasing net saving while maintaining nominal GDP growth. Other channels, such as defaults or inflation, can also play a role in belt-tightening episodes. The difficulty is how to support nominal GDP growth as private saving increases, since that implies a reduction in consumption growth. If households save more and businesses invest less, GDP will be reduced unless it is supported by another factor. Many countries historically have expanded net exports to offset those dampening effects. This occurred, for instance, in the Scandinavian countries in the 1990s and in the Asian countries after 1997 (Exhibit 30). But net exports are not the only mechanism to increase GDP growth: productivity growth can boost real GDP, as in the US experience in 1933–37, as can increasing the labor supply (through increased labor force participation, working longer before retirement, or immigration). Modest and controlled inflation would also increase nominal GDP growth.

Exhibit 30

In most historic episodes, an increase in net exports boosted GDP growth during deleveraging

Trade balance/GDP during deleveraging episodes, %



SOURCE: International Monetary Fund International Financial Statistics; McKinsey Global Institute

There are also several other ways in which an economy can deleverage without increasing national saving. For example, borrowing between financial intermediaries could fail. This could be an important driver of deleveraging in the United Kingdom, where bank lending to mortgage finance companies and other nonbank financial institutions contributed to the rise in total debt in the economy. In addition, deleveraging could occur if corporations increase the share of equity financing used to fund operations and reduce the share of debt. Lastly, falling house prices could mean smaller mortgages, slowing the rate of mortgage growth. Policy actions could also encourage deleveraging. For instance, reducing the tax preferences given to debt could shift household and corporate behavior, while tightening limits on the loan-to-value ratio could slow mortgage growth. Given the low personal saving rates in the United States and the United Kingdom today, policy measures such as these, while politically difficult, could be helpful in achieving a benign path of deleveraging.

It is doubtful today that one single macroeconomic factor will enable deleveraging, given the large sizes of the economies involved. It is more likely that deleveraging will occur through marginal improvements in many factors: some improvement in net exports, perhaps some increase in labor force participation, further defaults, maybe some inflation, and hopefully sustained productivity growth. Policies to enable and support these changes will be critical.[34]

DELEVERAGING TODAY MAY START LATER AND TAKE LONGER

While the historic record is helpful, several aspects of the crisis today could make deleveraging more difficult than in the past. Most of the past episodes involved one economy or a few relatively small economies following a national or regional crisis. Today, however, the crisis is global in scale, affecting the world's biggest economies, many of which are still in recession or experiencing very tepid growth. It is difficult to see how all the affected economies could simultaneously deleverage by boosting net exports, as many countries have done in the past.

Moreover, rising government debt may delay the start of deleveraging. Government debt is projected to increase sharply in Spain, the United Kingdom, and the United States. This could more than offset any deleveraging by the private sector, and thus delay the point at which an entire economy's debt-to-GDP ratio declines. Should these economies start deleveraging sooner through far more severe reductions in debt in the private sector, the economic recovery may be derailed.

Another possible path is that of Japan, where growing government debt has offset deleveraging by the private sector since 1990 (see sidebar, *Japan's experience: A cautionary tale*). As of the second quarter of 2009, Japan had the highest debt-to-GDP ratio of any country in our sample, with government debt alone equal to 197 percent of GDP. There are important differences between Japan's situation and that of the other highly leveraged mature economies today. Nonetheless, to avoid the Japan route, they will have to reverse the rise of government debt after the crisis passes and GDP growth revives, which will require hard policy choices.

Japan's experience: A cautionary tale

Could today's highly indebted countries follow Japan's example, with private sector deleveraging offset by a growing government debt? This question has been asked frequently because of the similarities between the current situation and Japan's experience in the 1980s and '90s. Japan's total debt-to-GDP ratio increased substantially in the 1980s as asset prices rose steeply in real estate and equity markets (Exhibit 31). The collapse of the Japanese asset bubbles in the early 1990s caused a financial crisis, an economic downturn, and widespread damage to private sector balance sheets. The Japanese crisis was followed by many years in which rising government debt offset deleveraging by the private sector—contributing to a "lost decade" of sluggish GDP growth. Today, similarly, while the US and UK private sectors have started to deleverage, public sector debt is rising.

Despite these similarities, several important differences separate Japan in the past and the mature economies' situation today. First, the scale of recent

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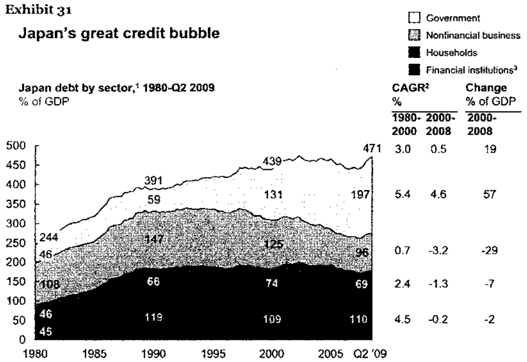
[34] See *Will US consumer debt reduction dampen the recovery?*, McKinsey Global Institute, March 2009, available at www.mckinsey.com/mgi.

Exhibit 31

Japan's great credit bubble



CAGR² % 1980-2000	CAGR² % 2000-2008	Change % of GDP 2000-2008
3.0	0.5	19
5.4	4.6	57
0.7	-3.2	-29
2.4	-1.3	-7
4.5	-0.2	-2

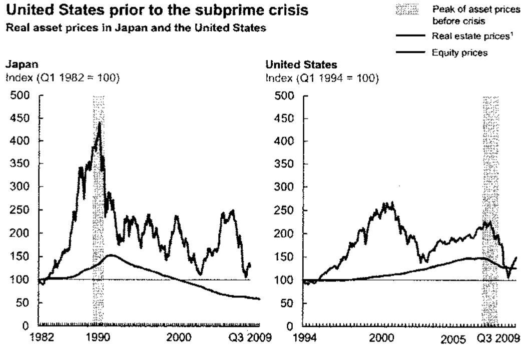
1 Some figures do not sum due to rounding.
2 Compound annual growth rate.
3 Asset-backed securities have been removed from financial sector borrowing to avoid double counting of the underlying loan.
SOURCE: Haver Analytics; McKinsey Global Institute

asset price appreciation, particularly in equity markets, before the current crisis was nowhere close to the levels seen in Japan from 1985 through 1989 (Exhibit 32). And after the bubbles burst, Japanese asset prices fell further and for a substantially longer period than we have seen so far today, resulting in a much larger destruction of wealth—more than 325 percent of GDP in Japan, compared with around 125 percent of GDP in the United States. Second, US and European banks have been far quicker to write down their loan losses, enabling the closure of unproductive businesses and the resumption of lending to new businesses. Third, monetary and fiscal authorities in today's

Exhibit 32

Asset price appreciation was greater prior to Japan's crisis than in the United States prior to the subprime crisis

Real asset prices in Japan and the United States



1 Real estate prices are the urban land price index in Japan and the FHFA purchase-only index in the United States.
SOURCE: Haver Analytics; McKinsey Global Institute

highly indebted countries have responded much more quickly and forcefully than did Japan's government, with large and unprecedented economic stimulus programs aimed at shoring up total demand. Finally, Japan faced structural rigidities in its labor and product markets that have hampered productivity growth, and an older and more rapidly aging population that made it more difficult to maintain GDP growth.

In other ways, however, the mature economies today may be in a worse position. Because of the global nature of this crisis, these economies have been unable to sustain exports; in contrast, Japan was able to export to other, healthier economies after its crisis. In addition, the United States and the United Kingdom today rely on foreign investors to fund their government debt, while Japan has been able to sustain high levels of government debt because it can draw on a large pool of domestic savings. This leaves countries today vulnerable to possible changes in foreign investor sentiment that could drive up interest rates, quashing an economic recovery.

All of this leads us to a conclusion that the most likely path forward today—particularly in the United States, the United Kingdom, and Spain— is one in which deleveraging is postponed until after the crisis passes and government debt growth is reined in. Then, these economies' debt burdens will most likely decline more slowly and over a longer period than the historical average. That is because not only will the private sector need to deleverage, given precrisis growth in debt, but the public sector will also have a large debt to pay down (see sidebar, *Sovereign deleveraging through history*). These highly leveraged economies may therefore remain vulnerable to economic shocks for some time. While we do not forecast GDP, it is likely that deleveraging will dampen GDP growth compared with what it would have been otherwise, possibly slowing the recovery.

Sovereign deleveraging through history

Government debt is projected to rise steeply in many crisis countries, which will likely offset any private sector deleveraging. The total debt-to-GDP ratio may therefore not change for some time—and when deleveraging does begin, these countries will face a larger government debt to pay off.

Fortunately, history provides many examples of successful government deleveraging. Looking back over US history since 1791, we find six sovereign deleveragings, with the earliest occurring soon after the War of Independence and the latest during the economic boom of the 1990s (Exhibit 33). Similarly in Great Britain, we see six examples of government deleveraging since 1692 with the greatest occurring after the end of a series of wars in 1812 (Exhibit 34). More recently, since 1990, we find a range of examples of government deleveraging: Canada, Spain, Belgium, and the Netherlands, among many others.

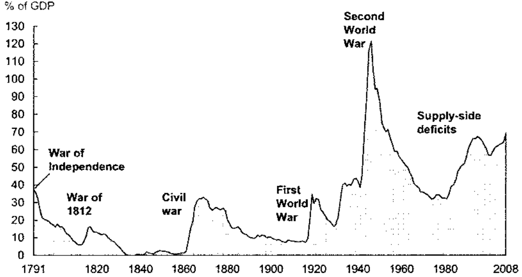
These historical episodes provide instructive lessons. Many sovereign deleveraging episodes occurred after wars as government spending declined, freeing up resources for the domestic economy—the so-called peace dividend. This helped spur economic growth and increase tax revenue. Although the United States and United Kingdom today have spent heavily on the ongoing conflicts in Afghanistan and Iraq, the amounts are much smaller relative to GDP than in many past wars. So while an end to those conflicts could possibly create some small peace dividend, the reductions are unlikely to boost GDP growth significantly.

Exhibit 33

The US government debt grew significantly during World War II

ESTIMATE

US gross[1] federal government debt
% of GDP



[1] To construct this long-term time series, we use US gross federal debt which includes debt held by the public as well as intra-government holdings; this methodology differs from the methodology we use to construct the medium-term time series across 14 countries (mainly that the long-term time series includes debt owed to social security funds, but excludes state debt); see *Appendix A: Technical Notes* for more details

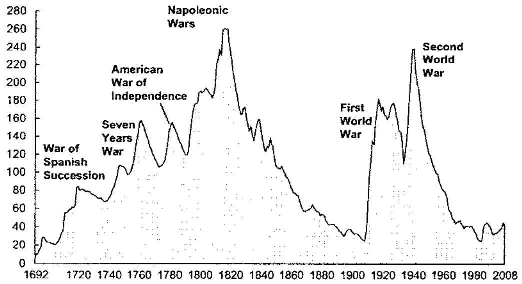
SOURCE: US Treasury Department; McKinsey Global Institute

Exhibit 34

The UK government has experienced several large expansions in public debt since 1692

ESTIMATE

UK net public debt
% of GDP



SOURCE: HM Treasury; Gregory Clark (2008), ukpublicspending.co.uk; Office of National Statistics; McKinsey Global Institute

POLICY MAKERS CAN TAKE STEPS TO PREVENT FUTURE CREDIT BUBBLES

Our analysis has several implications for policy makers and regulators seeking to ease the deleveraging process and enhance future financial market stability, and for business executives as they navigate through these turbulent times.

History shows that policy makers can enable healthy deleveraging by supporting GDP growth through the process. This will require working through multiple channels, such as spurring increases in net exports, productivity growth, and the labor supply. Additionally, policy makers need to carefully consider the timing of reducing government support of aggregate demand. Many historic examples, from the United States in 1938 to Japan in 1997, show the danger of prematurely withdrawing fiscal and monetary support of the economy. However, faced with rising public debt, many governments face an acutely difficult decision on the precise timing of the necessary public spending cuts.

In addition, the analysis presented in this report supports arguments in favor of at least seven measures for enhancing future stability that regulators and policy makers should note:

1. *Policy makers should work toward developing an international system for tracking leverage at a granular sector level across countries and over time.* Our analysis shows that identifiable pockets of leverage grew in several sectors in several major economies prior to the crisis. With our heat map, we have taken the first step toward developing a system for monitoring this type of leverage buildup in the future. But the data available today are limited and not always comparable across countries. We believe there would be great value in refining and strengthening this framework further. Some policy makers and regulators are already moving in a similar direction.[35] However, a purely national approach will not suffice, given the modern degree of cross-border lending and investment as well as the insights gleaned from cross-country comparisons. An international monitoring system could be maintained by, say, the Financial Stability Board or the International Monetary Fund (IMF). These international institutions would work with national governments to collect the required data, similar to the IMF's current role in collecting national balance of payments data. This would provide objective, international comparisons of debt and leverage essential to flagging future credit bubbles.

2. *Bank executives should adjust their internal risk models to reflect leverage in sectors of the real economy.* The first line of defense against unsustainable levels of leverage is bank management. Internal risk models should not only incorporate past rates of default on different types of assets but should also be adjusted to reflect growing leverage in sectors of the real economy, and ideally within pockets of borrowers within sectors. A revised Basel II framework could require banks to adjust their internal risk weights to reflect levels of leverage in the relevant sector of the real economy. This would need to be taken forward as part of the industry-wide debates on improving risk management, and there are considerable challenges to overcome to develop such a system. An international "early warning system" of high leverage (see point 1 above) would provide important guidance to

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[35] For example, the Bank of England has proposed a set of qualitative and quantitative metrics to assess the degree of "exuberance" in different sectors of the economy. See Bank of England, "The role of macroprudential policy," November 2009. Our framework has many conceptual similarities but differs in several ways, including the tracking of consistent metrics across countries to enable comparison.

bank executives in managing their risks and would give boards more ammunition to challenge management about the need to rein in risk appetite as leverage in specific sectors of the real economy increases. Given the need to measure and manage risk at a highly granular level, it would be both necessary and preferable for bank management, rather than regulators, to make these decisions, through risk management systems that properly reflect risk in the real economy. However, the expertise and resources required to maintain such a system at a bank management level would be significant.

3. *Macroprudential policy should also reflect leverage in specific sectors of the real economy.* The analysis in our report supports the current moves toward macroprudential policy. Some of the current proposals, such as that by the Bank of England, recognize the need to base policy on rising leverage within sectors of the real economy. The details of how to execute such a policy based on such information have yet to be worked out. It would be impractical and undesirable for regulators to intervene at a very micro level of detail. The right balance will need to be struck between regulators providing guidance on risks building up in the economy and bank management driving the execution of their own risk management systems.

4. *Financial regulators should reassess the need for further rapid increases in bank capital ratios.* This analysis provides strong support for many of the actions already taken by regulators—most importantly, the actions to rein in pockets of leverage (for example, at US broker dealers and at specific institutions) and in raising the quality of capital across the industry through higher Core Tier 1 ratios. Our analysis provides little support, however, for some other aspects of the current agenda of change: for instance, gross leverage ratios do not appear to be a reliable guide to bank capital adequacy. Moreover, we find that the banking system has now deleveraged to the point where capital levels are at or above the average over the 15 years before the crisis.[36] Whether more capital is needed on top of what banks have accumulated to date remains unknown.[37] Moreover, the likelihood of deleveraging in many mature economies argues for a very measured pace to any further increases in bank capital. Further deleveraging of the banks will either restrict credit supply to the real economy or raise the cost of credit. Either way, it will act as a drag on economic growth at exactly the time that these highly leveraged economies face other strong headwinds.

5. *Monetary policy makers should act to prevent pockets of leverage.* Central bankers note that it is difficult to identify an asset bubble until after the fact. We contend it is easier to see rising leverage in pockets of the economy, which very frequently point to an asset bubble, whether in real estate, equities, or debt instruments. This might imply that central bankers should adjust interest rates with an eye toward slowing (or stimulating) growth in leverage as well as controlling inflation. An alternative would be to restrain asset bubble growth with regulatory

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[36] On the basis of the ratio of risk-weighted assets to Core Tier 1 capital, the leverage of the US commercial banks declined from 16.3 in 2007 to 13.3 by the third quarter of 2009. This was slightly lower than the 15-year precrisis average of 13.8.

[37] A forthcoming working paper by the McKinsey Risk Practice (Buehler, Samandari, and Mazingo, *Capital ratios and financial distress: Lessons from the crisis*) analyzes the relationship between capital ratios and financial distress. It finds that three-quarters of the banks in financial distress would have weathered the crisis had their ratio of tangible common equity to risk-weighted assets been above 6.5 to 7.5 percent. Requiring a higher ratio than 7.5 percent entails sharply higher incremental costs to credit availability and would prevent a diminishing

tools, such as margin requirements or restrictions on loan-to-value ratios in mortgage lending.

6. *Tax preferences for debt, and especially for real estate lending, should be revisited.* Given the disproportionate role of real estate in driving both the current crisis and many in the past, policy makers should reconsider the highly preferential tax and capital treatment of residential mortgages. Doing so would be politically difficult. However, the evidence is clear: real estate absorbs far more bank lending than do small and medium-size enterprises and corporations. Real estate is prone to speculative bubbles, which have the potential to do considerable damage to the broader economy. Therefore, the degree to which residential real estate enjoys preferential tax treatment, low capital charges, and implicit government subsidies in some countries should be questioned. More broadly, the tax incentives for corporations to issue debt (or disincentives to issue equity) might be reconsidered to create a more level playing field between debt and equity financing.

7. *Regulators should also revisit the broader set of incentives for households taking on debt.* The surge in household debt was not limited to countries with very favorable tax treatment of residential real estate debt (for example, the United States). Countries without the tax incentives for real estate debt, such as Canada, Spain, and South Korea, also experienced steep increases in household leverage. Regulators should revisit the ease of access to credit for borrowers. For instance, they should consider limiting loan-to-value ratios, especially for less creditworthy borrowers.

Steering companies at a time of deleveraging is also a challenge for business executives. The process portends a prolonged period in which credit is less available and more costly, altering the viability of some of business models and changing the attractiveness of different types of investments. In historic episodes, private investment was often quite low for the duration of deleveraging. Today, the household sectors of several countries have a high likelihood of deleveraging. If this happens, consumption growth will likely be slower than the precrisis trend and spending patterns will shift. Business leaders will need flexibility to respond.

* * *

At this writing, the deleveraging process has barely begun. Each week brings news of another country straining under the burden of too much debt or impending bank losses from over-indebted companies. The bursting of the great global credit bubble is not over yet. Yet a challenging set of choices lies ahead. Deleveraging is likely to be a significant component of the recovery in many economies, which will dampen growth. Nevertheless, by learning lessons from historic experiences of deleveraging, today's policy makers may be better able to steer a course through these challenging waters. With thoughtful and brave policy choices, these economies may well emerge in a few years' time in good health—better balanced, more productive, more competitive, and back on a path of sustained long-term growth.

Appendix A: Technical notes

These technical notes provide more detail on some of the methodologies employed in this report. We discuss the following topics in more detail:

1. Methodology for assessing sustainability of leverage
2. Methodology for compiling comparable time series on financial institutions leverage
3. Methodology for compiling time series of debt to GDP

1. METHODOLOGY FOR ASSESSING SUSTAINABILITY OF LEVERAGE

We have developed a framework to assess the sustainability of leverage for individual sectors of the economy. The five components of this framework are the level of leverage, growth of debt and leverage, debt service capacity, vulnerability to income shocks, and the vulnerability to funding and interest rate shocks (see Exhibit 23 of the main section of this report). In this appendix section, we discuss in more detail a how we have analyzed these metrics to assess each sector's likelihood of deleveraging.

Metrics by sector

As we mention in the main section of this report, we have taken the first step toward developing a system for monitoring this growth of leverage in each sector of the economy. But the data available today are limited and not always comparable across countries. The metrics below represent trade-offs between fitness for purpose, data availability, and comparability across countries. We believe there would be great value in refining and strengthening this framework further.

To assess sustainability of leverage, we have used the following metrics in each sector.[1]

A. Household sector

1. *Absolute level of leverage.* We use household debt relative to disposable income as our main metric. This metric is preferable to household debt relative to assets, which may obscure leverage because of asset appreciation, and to debt relative to GDP, which does not take differing household income shares into account.

2. *Growth of debt and leverage.* We use the change in debt relative to disposable income between 2000 and 2008. Rapid growth in leverage can be a proxy for declining debt quality due to deteriorating underwriting standards, and it is one indicator of higher potential defaults in the future. Rapid leverage growth can

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[1] We use these five metrics as a starting point and make appropriate adjustments to our assessment to reflect idiosyncratic characteristics of a sector not captured in quantitative metrics. See section on scoring methodology.

also indicate asset booms, which are empirically linked to historical deleveraging episodes and crises.[2]

3. *Debt service capacity.* We use debt interest payments relative to disposable income. The ideal metric to use would be a debt service ratio, which includes both the interest payments and the principal repayment. However, this metric is publicly available only in select countries (e.g., the United States) and therefore would not allow for a comparison across countries.

4. *Vulnerability to income shocks.* We use debt relative to financial assets to assess vulnerability of households in case of an income disruption. The lower the ratio, the greater amount of assets relative to debt that can be drawn down to service interest payments if a borrower becomes employed. Ideally, we would use debt over financial assets, as these are more liquid. However, these data are not available across countries.

5. *Vulnerability to funding and interest rate shocks.* We use the share of variable-rate mortgages as a percentage of total mortgages. Although variable-rate mortgages typically lower debt service payments, they also make borrowers more vulnerable to interest rate increases.

B1. Corporate sector—Excluding commercial real estate subsector

1. *Level of leverage.* We use debt to book equity,[3] which we compile using a proprietary McKinsey database with financial statements of more than 50,000 publicly listed companies around the world. This ratio therefore excludes smaller, privately owned businesses for whom there is no publicly disclosed data. We have corrected for this through a qualitative assessment of the role and vulnerability of the small and medium-size enterprise sector in each country.

2. *Growth of leverage.* We use the change in the ratio of debt to book equity from 2000 to 2008. Sharp increases in leverage can be seen as a sign of increasingly imprudent borrowing and investment decisions (along with a corresponding deterioration of underwriting standards) and can be used as an indicator for higher potential nonperforming loans and defaults in the future.

3. *Debt service capacity.* We use the commonly used interest coverage ratio, defined as EBITA[4] over interest payments. A higher ratio indicates better debt-service capacity.

4. *Vulnerability to income shocks.* We use excess cash relative to total assets, with excess cash being defined as cash holdings over and above the cash portion of working capital typically required within a particular industry. A large proportion of excess cash holdings—a highly liquid asset—can be used to service debt in case of an income shock.

5. *Vulnerability to funding and interest rate shocks.* We use short-term debt relative to total debt. A high proportion of short-term debt might make companies

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[2] See Carmen Reinhart and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*, Princeton, NJ: Princeton University Press, 2009.

[3] We estimate that the incorporation of unfunded pension liabilities as a form of debt increases the leverage of most corporate sectors by 10 to 20 percent. These liabilities are particularly large in Germany, where they increase leverage by about 40 percent, and the United Kingdom, where they increase it by about 30 percent.

[4] Earnings before interest, tax, and amortization.

vulnerable to funding shocks. Companies with longer-term funding can sustain higher levels of debt due to reduced rollover risk.

B2. Corporate sector—Commercial real estate subsector

We have made an attempt to split out the commercial real estate (CRE) subsector from the overall corporate sector, as the dynamic of CRE-related borrowing differs from typical corporate borrowing in its high sensitivity to real estate asset prices. The CRE subsector includes public and private real estate investment vehicles (e.g., investment partnerships, real estate funds, REITs, and the investment portfolios of developers). It does not include businesses related to real estate, such as construction companies or building material supply companies, which are in the non-CRE corporate sector of our analysis. Because commercial real estate companies are generally private entities, there is a scarcity of publicly available data, particularly data that are comparable across countries. The metrics used here have thus been selected based on availability and do not map directly onto our standardized framework. A more complete scoring system should incorporate additional factors such as loan-to-value ratios as a measure of leverage and debt service coverage ratios as a measure of service capacity. In addition, refinancing needs would have to be evaluated on a short-term (say, monthly) basis. We have used the following metrics:

1. *Projected rent growth for prime office rentals in major commercial cities.* Highly negative rent growths indicate challenges for CRE companies because of lower income and therefore lower ability to service debt.

2. *Historic total return to direct investment.* We compare the returns over 2004–07 with historic returns to gauge the extent of the CRE asset bubble. High returns on face value are good, but they also are a potential indicator for a bubble. If returns are particularly high over a prolonged period, it's worth a second look at the fundamentals. Also, if the fundamentals support higher returns, we would expect new players to enter the market and drive down returns.

3. *Distressed CRE assets relative to GDP.* We use this metric as a proxy for the potential magnitude of deleveraging driven by defaults in the CRE subsector.

4. *Capitalization rates for commercial office buildings in prime central business district areas.* Capitalization rates are defined as net operating income relative to the market value of the property. We use this metric as a proxy for assessing the riskiness of CRE investments. Capitalization rates reflect the yield that investors are demanding as compensation for investing in a particular area. The higher the capitalization rates, the riskier the investments (as perceived by investors).

5. *CRE debt expiring within five years relative to total debt.* A high proportion of debt that needs to be refinanced in the short to medium term might make companies vulnerable to funding shocks, particularly in an environment of higher interest rates.

C. Financial institution sector

1. *Level of leverage.* We use tangible assets relative to tangible common equity.[5] This metric reflects the quality of capital better than the gross leverage ratio of assets to equity and is widely used by banking analysts.

2. *Growth of leverage.* We use the variance of tangible assets to tangible common equity from a longer-term, 15-year average in order to identify financial institution sectors that have elevated levels of leverage. As a second metric, we use medium-term (2007 to 2009) growth rates of loans. Sharp increases in financial institutions' loan books can be seen as a proxy for declining asset quality (because of likely deterioration of underwriting standards).

3. *Debt service capacity.* We do not use this metric as it is not meaningful for the financial institution sector.

4. *Vulnerability to income shocks.* We use liquid assets relative to total assets, with liquid assets including cash, deposits, interbank assets, repurchase agreement assets, and holdings of bonds of national governments. A higher proportion of these liquid assets will help financial institutions pay down debt in the event that income is lower than expected.

5. *Vulnerability to funding and interest rate shocks.* We use short-term wholesale funding relative to assets. A high proportion of short-term wholesale funding makes financial institutions more vulnerable to funding shocks—the current financial crisis was a prominent example for this. We also use the commonly used loans-to-deposits ratio. A lower ratio of loans to deposits means that more of the financial institutions' lending activities are funded by deposits, which are a relatively long-term source of funding.

D. Government sector

1. *Level of leverage.* We use the level of government debt relative to GDP.

2. *Growth of leverage.* We use change in government debt relative to GDP between 2000 and 2008.

3. *Debt service capacity.* We use interest payments relative to tax revenue. High interest payments relative to tax revenue leave governments with less room for debt repayment.

4. *Vulnerability to income shocks.* We use net debt relative to GDP, where net debt is defined as gross government debt less foreign exchange reserves, intra-government and central bank holdings of government debt. Net debt represents the debt in excess of liquid assets. The higher net debt levels, the more challenging it might be for governments to meet short-term funding requirements.

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[5] Intangible assets include goodwill, deferred tax assets, and other items such as certain servicing rights and software expenses that accounting rules permit banks to capitalize and hold on their balance sheet as assets. Tangible assets and tangible common equity are calculated by deducting the value of these intangibles from total assets and total common equity respectively.

5. *Vulnerability to funding and interest rate shocks.* We use the foreign-owned share of total government debt. Historically, there has been a tendency of creditors reluctant to continue funding foreign debt in case of crisis.[6]

Scoring methodology

Given that multiple noneconomic factors will determine the trajectory and extent of a sector's deleveraging, the assessment that we make with the heat map is necessarily probabilistic in nature. We thus use the above framework as a basis to systematically assess the *likelihood* of deleveraging in a particular sector. We do this with a relatively short-term focus, i.e., our assessment should be read in the context of sectors starting deleveraging within one to two years.

Assessing the likelihood of deleveraging with our suggested framework involves an iterative evaluation of five quantitative metrics along with qualitative insights derived from expert sources. For a particular sector, each quantitative metric is evaluated against the median level of that metric for the ten mature economies in our sample and (where relevant) its deviation from historical norms. The two primary metrics are the level of leverage and the growth of leverage. A high score on one or both of these metrics warrants the rating of "higher likelihood of deleveraging" unless remaining metrics are exceptionally low (indicating mitigating factors that make high leverage sustainable). The converse applies for "lower likelihood of deleveraging" ratings. Ratings are then cross-checked with insights from expert sources (such as International Monetary Fund country reports), and adjustments are applied as necessary if there are important but idiosyncratic characteristics of a sector not captured by the quantitative metrics.

In the following, we provide more detail on how the above scoring methodology was applied to the individual sectors. Our ratings are color-coded: red indicates high likelihood of deleveraging; yellow indicates moderate likelihood; green indicates low. We also provide more details on assessments that we feel require further clarification. The full assessment can be found in the main section of this report (and in Exhibit 24 of the main section of this report).

A. Household sector

The primary metrics for households are the ratio of debt to disposable income and its growth. All sectors with debt-to-disposable income ratios above the median and double-digit leverage growth are rated "higher likelihood of deleveraging," with debt service ratios considered as a secondary measure. Switzerland's deleveraging risk is reduced to "moderate likelihood of deleveraging" because all other factors (e.g., funding and liquidity) point to a particularly strong ability by Swiss households to weather shocks.

B1. Corporate sector—Excluding commercial real estate subsector

The primary metric considered is debt to book equity. Here we see a clustering around a moderate range, with the Spanish sector as the clear outlier. Spain's corporate sector overall has a markedly higher leverage ratio (measured as debt to book equity) than that in other countries and it has increased significantly since 2000. However, this aggregate figure includes some very highly leveraged construction companies. It may also reflect the industry mix in Spain, which has more large, global companies in industries that typically are more highly leveraged. We therefore split our assessment into red for the construction and real estate-related companies and green for the remainder.

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[6] In the 1997 Asian financial crisis and the 1998 Russian crisis, bank lending was also the most volatile type of capital flow. See Martin N. Baily, Diana Farrell, and Susan Lund, "The color of hot money," *Foreign Affairs*, March/April 2000.

B2. Corporate sector—Commercial real estate subsector

Total returns that are higher than historic total returns provide an indictor of a potential real estate bubble. Forecast rental growth or declines provide insight into the ability of the sector to service its debts. Countries with high total returns and large forecast rental declines are considered "at risk." These "at risk" countries are then run through the filters of the troubled asset ratio (which indicates that there is a material adverse impact on sector health) and capitalization rates (which approximate investors' views on risk premia), and they are evaluated for refinancing risk. "At risk" sectors that rank poorly on two or more of these criteria are scored as "higher likelihood of deleveraging."

C. Financial institution sector

Given the structural differences in the balance sheets of financial sectors, leverage is evaluated primarily against 15-year historical averages rather than against a peer median. Asset growth (specifically bank lending), a second primary risk factor, is used as a proxy for the deterioration of asset quality on balance sheets. The data show that financial institutions' leverage has already fallen to the averages that prevailed for 15 years before the crisis in most countries.

The financial sectros in all countries face a moderate likelihood of further deleveraging. The reasons differ by country. For some, such as the United Kingdom, high reliance on short-term wholesale funding may prompt further deleveraging. In other countries, such as the United States, deteriorating commercial real estate assets will force some banks to raise more capital or reduce lending. And banks in all countries could be affected by regulatory changes that increase capital ratios.

For Spain's financial sector, we recognize a marked divergence in the position of the larger banks compared with the smaller regional ones. The deflating Spanish real estate bubble is likely to affect most heavily the small and medium-sized savings banks (the cajas), which have a larger proportion of their balance sheets exposed to domestic real estate and which have experienced signficantly higher rates of nonperforming loans than larger banks. Large Spanish banks such as Santander and BBVA are not in a materially different position than other global banks, given the international diversity of their assets and their strong capital ratios. We therefore rate the Spanish financial sector in the heat map as yellow for the larger banks, but red for the smaller banks, which have a higher likelihood of deleveraging going forward. We also recognize that given widespread capital raising by the banks after the second quarter of 2009, the financial institutions sector might now be further down the path of deleveraging.

D. Government sector

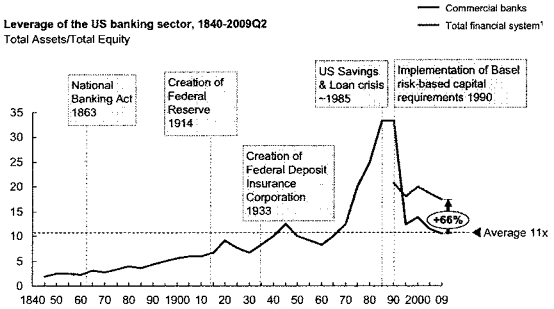
Debt to GDP is the primary metric of interest: all countries with levels above peer medians (and in excess of 100 percent of GDP) are deemed to be at risk (i.e., Italy and Japan). As discussed in the main section of this report, developed economy governments appear very unlikely to deleverage anytime soon. With the exception of Japan, governments in the mature economies entered the crisis with stable debt burdens and declining debt service payments. And government debt-to-GDP ratios in the affected economies are projected to rise in coming years due to spending in response to the financial crisis and recession. Although we characterize the governments of Japan and Italy as "at risk" of deleveraging, we don't see either of them as having a "high likelihood of deleveraging" (red) in the next few years, for different reasons: Japan's high government debt is offset by high levels of financial assets and is amply funded by domestic household savings; Italy's debt levels are mitigated by its strong debt service capacity. In the longer term, however, aging populations may make it harder for some governments (especially Japan and Italy) to sustain their debt levels.

2. METHODOLOGY FOR COMPILING COMPARABLE TIME SERIES ON FINANCIAL INSTITUTIONS LEVERAGE

We have chosen to compile the time series used to compare financial institutions leverage across countries from 1990 onward. Focusing on the period since 1990 provides both theoretical and practical benefits: this period marks the takeoff of globalized financial markets, a modern era of central banks and formal banking regulation. It also offers a wider range of comprehensive data across countries. For completeness, we have included a long-term time series of US bank leverage ratios in Exhibit A.1.

Exhibit A.1

Evolution of leverage in the US banking sector



1 Aggregate leverage of banks, finance companies, government-sponsored entities, and pools of securitized assets.

SOURCE: Adapted from A. Berger, R. Herring, and G. Szego, "The role of capital in financial institutions," 1995.

We adopt a "bottom-up" approach to develop our time series data on levels of financial sector leverage in each country. This approach involves the creation of a "sectoral" balance sheet for each country through the aggregation of balance sheet items from individual institutions as reported in their financial statements and regulatory filings. This provides us with a detailed breakdown of the components of assets and capital, which allows us to develop a picture of leverage across multiple metrics (specifically assets to equity, tangible assets to tangible common equity, and risk-weighted assets to Tier 1 capital). The approach also allows us to conduct a more detailed analysis of the drivers of changing leverage and, where necessary, to make appropriate accounting adjustments to ensure that data are comparable across countries.

Data for our leverage calculations are drawn from multiple sources. Whenever possible, we draw on local databases that provide balance sheet information for all financial institutions within a particular country. For example, in the United States, we use SNL Financial, which aggregates data from financial and regulatory filings of all banks, thrifts, broker dealers, and finance companies. In the case of Canada and India, similar detailed data are available via online repositories held by national financial regulators.

Where comprehensive local databases do not exist at the level of detail required for our leverage calculations, we identify a list of the major publicly listed financial institutions that constitute the majority the banking sector assets (in most of the countries cover by this study, the top 20 institutions cover about 70 percent of banking assets). Financial statements of these institutions are then sourced from private databases such as Bloomberg, Compustat and Thomson Reuters and are then aggregated into a proxy for the national financial sector balance sheet. The results of our leverage calculations are then cross-checked against broad sectoral measures derived from regulatory sources to ensure a consistency in trends.

Germany and Italy are the two countries for which our bottom-up methodology does not apply. This is because of the relatively low levels of concentration in these two banking sectors, where the significant assets are held by large numbers of small privately owned savings banks, credit cooperatives, and mutual banks (the *Sparkassen* in Germany and the *Banche Popolari* and *Banche di Credito Coopertivo* in Italy) for which detailed bottom-up data are not available. In this case, we use as our baseline gross leverage numbers that we calculate from aggregate sectoral data available via the European Central Bank. Figures for tangible common equity and Tier 1 Capital are then calculated using estimates of the ratio of these numbers to total equity. These ratios are derived via a sampling of publicly listed banks and input from internal experts.

Accurate cross-border comparisons of bank leverage are notoriously difficult because of differences in national accounting rules. Broadly speaking, European banks filings are made in accordance with International Financial Reporting Standards (IFRS), while the United States and other countries use Generally Accepted Accounting Principles (GAAP) or equivalent systems. For large financial institutions, balance sheets reported under IFRS tend to be significantly larger than if they were reported under GAAP. This variance is driven by the different provisions of IFRS and GAAP for such reporting items as derivative positions, reverse repurchase agreements/borrowed securities, and brokerage and securities-related receivables. In an extreme case, leverage ratios under IFRS can be more than double their equivalents that are calculated under GAAP.

We have developed a methodology for adjusting sectoral data for countries in our sample into a common GAAP basis. We focus on correcting for the differences in reported derivative positions, which can account for 90 percent of the variance in balance sheet size across the two accounting methods. For each European country in our study, we selected two to three of the largest financial institutions and conducted a deep dive into their full financial statements and regulatory filings, which yielded a detailed translation of their 2007–08 derivative assets into GAAP-equivalent terms. We then interviewed a series of experts in each of these countries to determine the percentage of derivative trading that is concentrated by the selected large financial institutions (generally in the range of 80–90 percent). We used these estimates to "gross up" the derivatives adjustments that we had calculated for the large banks to larger adjustment that could be applied to the entire financial sector (i.e., to account for derivative assets held by smaller banks). To translate these adjustments back in time for earlier periods, we created an index based on global over-the-counter derivative volumes (as reported by the Bank for International Settlements) with 2008 set as the base year. The sector-wide derivative adjustments for years prior to 2008 were calculated by multiplying the dollar adjustment for 2008 to the corresponding value of the volume-based index for a particular year. We tested this methodology against a sample of manually reconciled bank financials from earlier years and found that it was accurate enough for our purposes.

A final note is warranted for the leverage ratios that we have presented for the United States. The US financial system is unique in the high levels of specialization among its financial intermediaries. In addition to commercial banks, important players in the financial system include large broker-dealers, finance companies, government-sponsored enterprises (GSEs), and securitization markets. Focusing purely on banking institutions would thus present a misleading picture of financial leverage. As a result, we have included in our calculations a leverage ratio for the "US financial system" that is distinct from the ratio for the "US banking system." We generate this number by summing up the assets and equity of all financial intermediaries: the commercial banks, savings institutions, credit unions, broker dealers, and finance companies. To control for the outsized share of securitization in the US financial system, we have also added the aggregate assets of issuers of asset-backed securities as reported by the Federal Reserve's flow of funds. While not technically on the balance sheets of financial institutions, these assets are included on the assumption that many, if not all of them, bore some form of guarantee by their originators.

3. METHODOLOGY FOR COMPILING TIME SERIES OF DEBT TO GDP

To construct time series of sector level debt relative to GDP, we draw extensively on national balance sheet statistics published by central banks (flow of funds). Following the methodology of the Federal Reserve in the United States, we count as debt those instruments that constitute direct credit market borrowing. This includes all bond market borrowing, including commercial paper, and all loans regardless of lender. We exclude all equity-type funds (e.g., mutual fund shares, beneficiary certificates).

To define the entities included in each sector, we have followed the standard followed by most central banks, SNA 93. The household sector includes households, nonprofit institutions serving households, and private unincorporated businesses, such as sole proprietorships. In the case of Canada, this category also includes nonfinancial non-corporate business.

The nonfinancial business sector includes all companies regardless of whether they are publicly or privately held. This category also includes so called quasi-corporations such as partnerships (e.g., law firms) as well as state-owned enterprises.

The government sector includes debt raised by central, local, and provincial/state governments. Debt is presented on an unconsolidated basis in most cases and includes intra-government debt holdings. There exists some discrepancy in how countries report social security fund holdings, which can make a material difference in the level of debt. For instance, US government debt holdings in the Social Security Trust Fund are excluded from national balance sheet statistics; if included, they would raise total government debt outstanding by more than 50 percent. In contrast, Japan reports its full holdings of government debt in the social security trust fund.

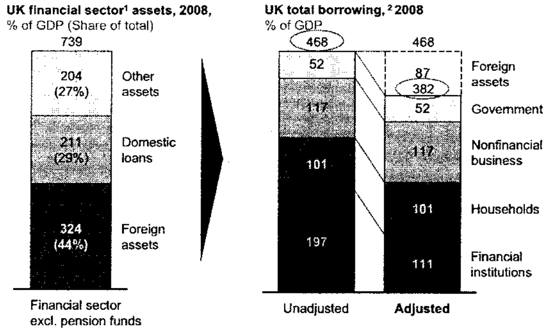
The financial sector includes a broad range of financial institutions. Both central banks and all other deposit-taking banks are included in this category. In addition, this category includes many non-deposit-taking institutions such as broker-dealers, finance companies, public financial agencies (e.g., Fannie Mae), and financial auxiliaries such as stock exchanges. We make a significant adjustment to the officially reported figures by removing asset-backed securities from debt figures. This is because the underlying loan collateral is counted in the relevant sector and the inclusion of asset-backed securities would result in the double-counting of debt. Where these data are unavailable from the central bank, we draw on a combination of data from the European securitization forum and Dealogic to create our own estimates of outstanding asset-backed securities.

For countries such as the United Kingdom, which play a role as financial and business hubs, the methodology of establishing the domicile of a business is an important determinant of the level of aggregate debt. Central banks follow balance of payments methodology in compiling national balance sheet accounts, and every business with significant operations in the host country will be counted as local by the central bank. For instance, the UK subsidiary of an American company will be counted as a UK company in the national balance sheet accounts.

In the case of the UK financial sector, which functions as a global financial hub, we present two versions of its outstanding debt figures—an unadjusted figure and a figure adjusted for its offshore banking activities (Exhibit A.2). As a result of its role as a foreign banking hub, the United Kingdom has significant foreign banking assets and liabilities. Given that some foreign liabilities fund local domestic activities, it would be inappropriate to exclude these liabilities from total financial sector debt. Instead, we adjust financial sector debt by multiplying it by the share of financial sector assets that are local rather than foreign in nature. This removes some of the financial sector debt that has no bearing on the aggregate performance of the UK economy, such as the London offices of German banks purchasing US assets abroad. However, in some measures this adjustment also goes too far: also excluded are local funds raised by British banks to lend to non-UK borrowers. If these banks run into financial trouble,

Exhibit A.2

Even after removing foreign lending by UK banks, UK debt / GDP remains higher than every country's except Japan (382 percent)



1 In national accounting methodology, all banks with domestic business are classified as domestic irrespective of parent company ownership e.g. Deutsche Bank London subsidiary (Deutsche Bank A.G.).
2 Some figures do not sum due to rounding.

SOURCE: McKinsey Global Institute

the responsibility may lie on the shoulders of the British government to backstop these financial institutions irrespective of the ultimate location of their loans.

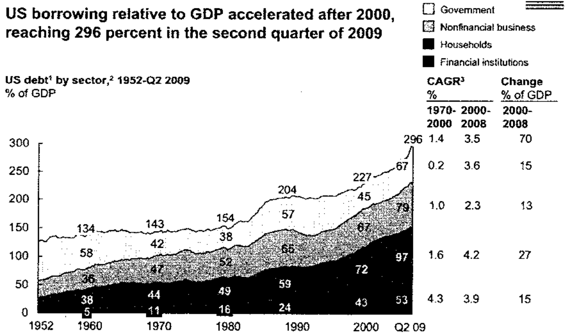
An adjustment similar to the one for the UK financial sector debt would be required for the UK nonfinancial business debt to reflect the UK's position as domicile of large international corporations' headquarters, which are taking on debt to fund operations outside the UK (e.g., BP, Rio Tinto, and SABMiller). Unfortunately, reliable data to adjust for this position are currently not publicly available. However, a data point that can be used for a rough triangulation for debt funding domestic nonfinancial business operations is the GBP £475 billions (as of 2008) of Sterling lending to UK nonfinancial corporations, which represents roughly 33 percent of UK GDP. This figure is significantly lower than the 114 percent of total UK nonfinancial corporations debt relative to GDP and by definition neglects foreign-denominated debt, but gives a lower bound for the UK corporate sector debt.

We have constructed our estimates of debt for Brazil, China, India, and Russia from a variety of sources. These sources include central bank estimates of bank loan composition, estimates of outstanding bonds and external loans from the Bank for International Settlements, and estimates of domestic private credit from the International Monetary Fund's International Financial Statistics. While these estimates are by no means comprehensive, they capture the debt through the major channels of credit allocation.

Finally, in presenting these figures, we have normalized them by GDP. We have followed the methodology of the Bureau of Economic Analysis in the United States by annualizing seasonally adjusted quarterly GDP figures. When comparing our quarterly estimates with annual estimates, this may result in small differences in aggregate debt to GDP, particularly at the end of 2008 where GDP fell in many countries during the fourth quarter. We present below our data on debt to GDP by country for our sample (see Exhibits A.3 to A.16).

Exhibit A.3

US borrowing relative to GDP accelerated after 2000, reaching 296 percent in the second quarter of 2009

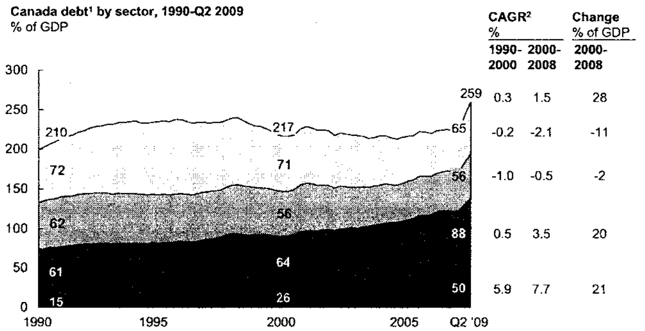


1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Federal Reserve Flow of Funds; McKinsey Global Institute

Exhibit A.4

Canada's debt growth has been moderate compared with other major developed markets

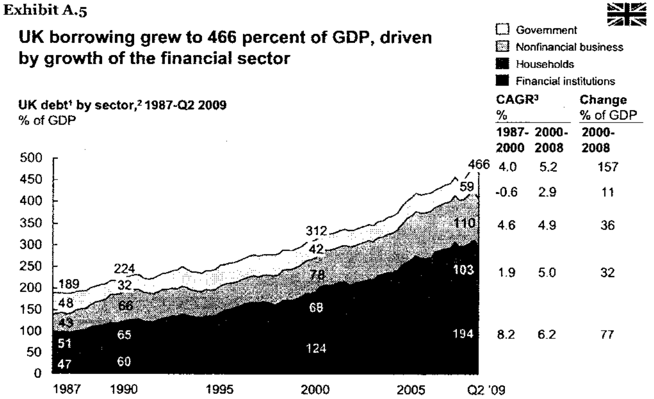


1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.5

UK borrowing grew to 466 percent of GDP, driven by growth of the financial sector



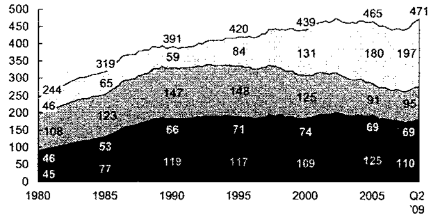
1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.6

Japan's debt outstanding has stabilized overall, with government debt displacing falling private sector debt

Japan debt[1] by sector,[2] 1980-Q2 2009
% of GDP



CAGR[3] % 1980-2000	CAGR[3] % 2000-2008	Change % of GDP 2000-2008
3.0	0.5	19
5.4	4.6	57
0.7	-3.2	-29
2.4	-1.3	-7
4.5	-0.2	-2

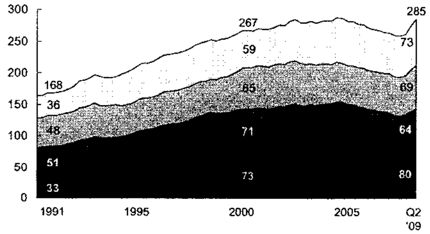
1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.7

Germany's debt growth took off after reunification but stabilized after 2000

Germany debt[1] by sector,[2] 1991-Q2 2009
% of GDP



CAGR[3] % 1991-2000	CAGR[3] % 2000-2008	Change % of GDP 2000-2008
5.3	0.3	7
5.8	1.9	10
3.3	0.3	2
3.9	-2.0	-11
8.9	1.0	6

1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

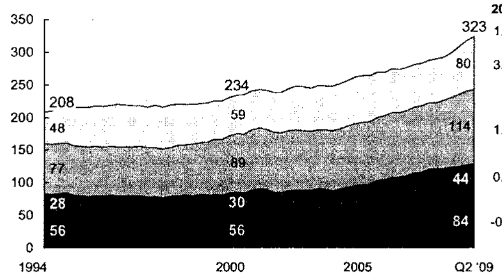
SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.8

France experienced an acceleration in borrowing after 2000, reaching 323 percent of GDP in Q2 2009

France debt[1] by sector,[2] 1994-Q2 2009
% of GDP

☐ Government
▨ Nonfinancial business
■ Households
■ Financial institutions



CAGR[3] % 1994-2000	CAGR[3] % 2000-2008	Change % of GDP 2000-2008
1.3	4.0	83
3.5	2.8	14
1.6	3.4	26
0.6	5.3	15
-0.9	5.6	29

1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

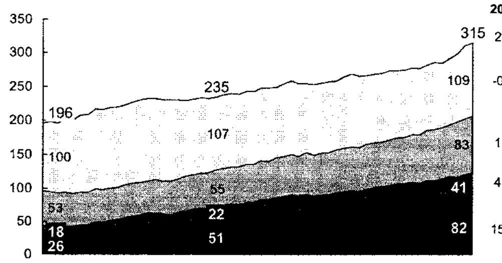
SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.9

Italy's government debt accounts for a substantial part of its overall borrowing

Italy debt[1] by sector,[2] 1995-Q2 2009
% of GDP

☐ Government
▨ Nonfinancial business
■ Households
■ Financial institutions



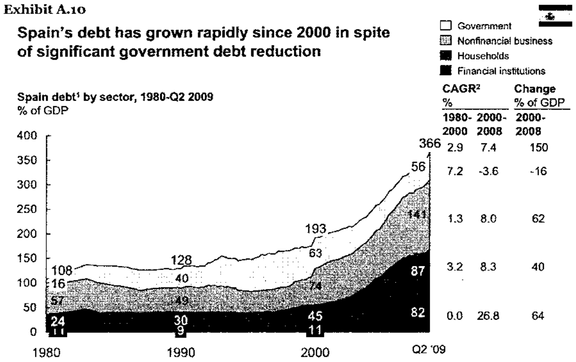
CAGR[3] % 1995-2000	CAGR[3] % 2000-2008	Change % of GDP 2000-2008
2.9	3.1	64
-0.2	-0.8	-7
1.3	5.0	26
4.4	7.8	18
15.0	5.4	27

1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.10

Spain's debt has grown rapidly since 2000 in spite of significant government debt reduction



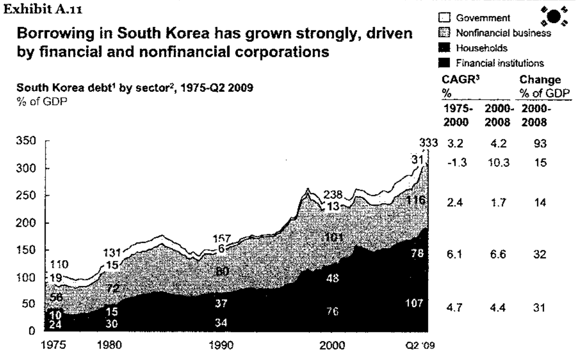
CAGR² %		Change % of GDP
1980-2000	2000-2008	2000-2008
2.9	7.4	150
7.2	-3.6	-16
1.3	8.0	62
3.2	8.3	40
0.0	26.8	64

1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.11

Borrowing in South Korea has grown strongly, driven by financial and nonfinancial corporations



CAGR³ %		Change % of GDP
1975-2000	2000-2008	2000-2008
3.2	4.2	93
-1.3	10.3	15
2.4	1.7	14
6.1	6.6	32
4.7	4.4	31

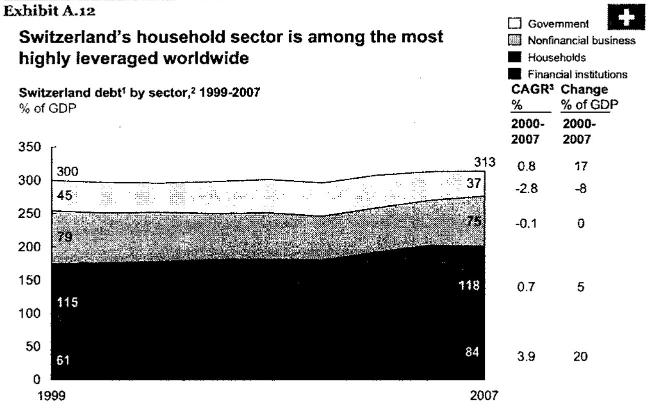
1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Bank of Korea; Haver Analytics; McKinsey Global Institute

Exhibit A.12

Switzerland's household sector is among the most highly leveraged worldwide

Switzerland debt[1] by sector,[2] 1999-2007
% of GDP



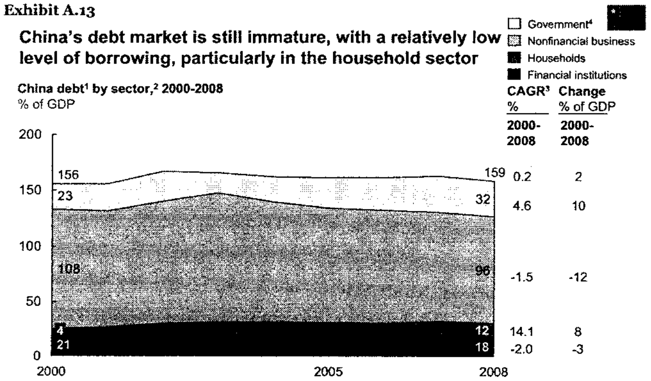
1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.13

China's debt market is still immature, with a relatively low level of borrowing, particularly in the household sector

China debt[1] by sector,[2] 2000-2008
% of GDP

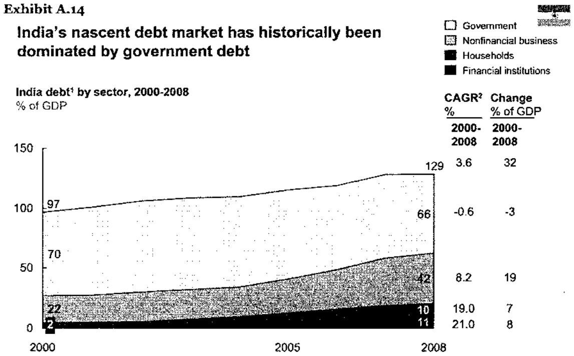


1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.
4 Includes central bank stabilization bonds.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.14

India's nascent debt market has historically been dominated by government debt



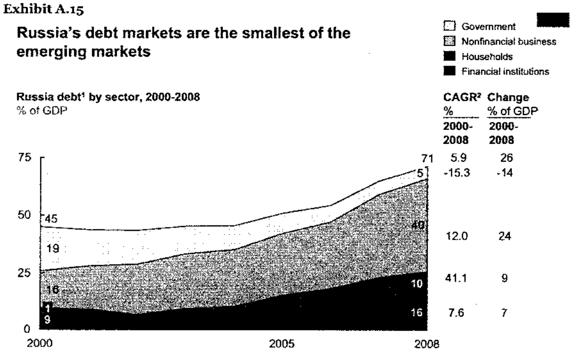
India debt[1] by sector, 2000-2008
% of GDP

[1] Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
[2] Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.15

Russia's debt markets are the smallest of the emerging markets



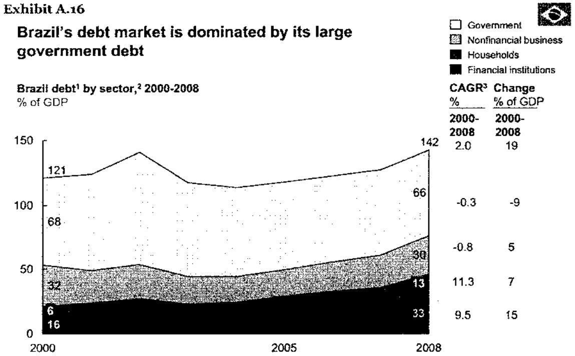
Russia debt[1] by sector, 2000-2008
% of GDP

[1] Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
[2] Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Exhibit A.16

Brazil's debt market is dominated by its large government debt



Brazil debt[1] by sector,[2] 2000-2008
% of GDP

1 Includes all instruments that constitute direct credit market borrowing (includes all bond market borrowing and commercial paper); excludes asset-backed securities to avoid double counting of the underlying loan.
2 Some figures do not sum due to rounding.
3 Compound annual growth rate.

SOURCE: Haver Analytics; McKinsey Global Institute

Appendix B: Historic episodes of deleveraging

This appendix presents more detail on historic deleveraging episodes. We will discuss:

A. The methodology employed to analyze historic episodes of deleveraging and the list of episodes identified.

B. A detailed discussion of seven case studies of deleveraging that cover most of our four deleveraging archetypes: the United States 1929–43, the United Kingdom 1947–80, Finland 1991–98, Malaysia 1998–2008, Mexico 1982–92, Argentina 2002–08, and Spain 1976–80.

C. A discussion of deleveraging episodes that did not follow a financial crisis.

A. METHODOLOGY FOR ANALYZING HISTORIC EPISODES OF DELEVERAGING

We have built a detailed database of debt across 50 countries[1] since 1950 to identify episodes in which economies went through a phase of deleveraging. We augmented this with additional case studies from the United States during and after the Great Depression (1929–43). These long-term time series were built using two key sources: International Monetary Fund (IMF) data series on bank credit (including domestic bank lending, but lacking any data on capital markets and foreign credit) as well as McKinsey Global Institute proprietary data on private debt securities (i.e., ABS, corporate bonds, bonds issued by financial institutions) and government bonds. We split the debt into private and public sector debt.

Definition of "deleveraging"

We consider only "significant" episodes of deleveraging in our analysis, defined either as an episode in which the ratio of total debt to GDP declined for at least three consecutive years and fell by 10 percent or more or an episode in which the total stock of nominal credit in the economy declined by 10 percent or more. Doing so, we identified 45 episodes of deleveraging: in 31 cases, both private and public sector debt-to-GDP ratios declined; in nine cases, only the private sector debt-to-GDP ratio declined (while the public sector either had an increasing or stable debt-to-GDP ratio); in five cases, only the public sector debt-to-GDP ratio declined (Exhibit B.1). We also identified 32 episodes (e.g., the United States in 1997–2001) in which the public sector deleveraged but the total economy did not deleverage because private sector debt increased. And we found two episodes (Japan 1997–2008 and Hungary 1987–1996) in which the private sector deleveraged, but the total economy did not deleverage because of an increase in government debt to GDP.

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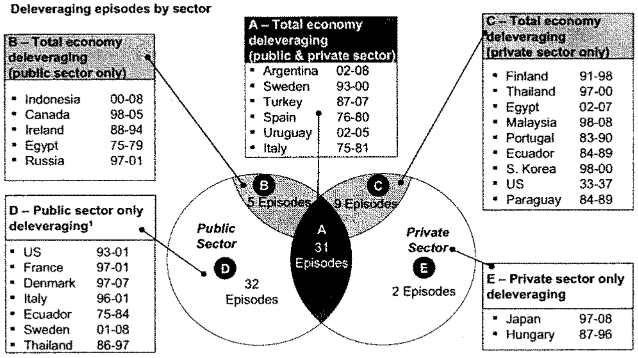
[1] Countries included in the database are: Argentina, Austria, Belgium, Bolivia, Brazil, Bulgaria, Cambodia, Canada, Chile, Colombia, Costa Rica, Croatia, Denmark, Ecuador, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Indonesia, Ireland, Italy, Japan, Lithuania, Luxembourg, Malaysia, Mexico, Netherlands, Nicaragua, Nigeria, Paraguay, Philippines, Poland, Portugal, Romania, Russia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, the United States, United Kingdom, and Uruguay.

Exhibit B.1

Historic deleveraging episodes

Deleveraging episodes by sector



1 The 25 other public sector only deleveraging episodes were: Austria 87-92, Austria 95-08, Bulgaria 02-08, Costa Rica 04-08, Croatia 05-08, Ecuador 75-84, Estonia 04-07, Finland 68-74, Finland 01-08, France 86-91, Greece 00-08, Indonesia 87-92, Ireland 94-06, South Korea 88-94, Malaysia 91-97, Netherlands 72-77, Netherlands 95-02, Portugal 65-71, Portugal 94-00, Russia 02-08, South Africa 04-07, Spain 96-07, United Kingdom 98-01, United Kingdom 87-90, United States 49-74 .

SOURCE: International Monetary Fund; McKinsey Global Institute

Archetypes of deleveraging

We then identified common characteristics of the 45 deleveraging episodes and classified them into four archetypes of deleveraging, using the following sequential classification rules:

1. Any deleveraging episode that was recognized by Federico Sturzenegger and Jeromin Zettelmeyer in their book, *Debt Defaults and Lessons from a Decade of Crises*, as a period of significant default was classified under the "massive default" archetype (seven episodes).[2]

2. Any deleveraging episode that was not already classified as a "massive default" and in which the economy experienced rapid (and off-trend) productivity and real GDP growth was classified under the "growing out of debt" archetype. We defined off-trend GDP growth as episodes in which the compound annual growth rate of GDP during the episode was least 100 percent higher than in the ten years before the crisis, or the longest time series available (three episodes).

3. Any deleveraging episode that was not already classified as "massive default" or "growing out of debt," and in which the inflation rate during the episode was on average at least 10 percent in mature economies or 20 percent in emerging markets, was classified under the "high inflation" archetype (12 episodes).

4. In the 23 remaining episodes, debt growth was slower than GDP growth or the nominal stock of debt declined. We classified these as "belt-tightening."

We then cross-referenced the 45 deleveraging episodes with the set of financial crises documented by economists Carmen Reinhart and Ken Rogoff.[3] We found that 32 of the 45 deleveraging episodes followed a financial crisis. Of the 13 that were not after a financial crisis, seven episodes originated from government policy choices to reduce debt or slow down debt growth (e.g., Belgium 1997–2004 due to joining the euro monetary union); four episodes were due to high inflation (e.g., Italy 1975–81); and two were due to off-trend GDP growth (Egypt 1975–79 because of a war and Nigeria 2001–05 during an oil boom). We discuss these episodes in more detail in section C of this appendix.

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[2] Federico Sturzenegger and Jeromin Zettelmeyer, *Debt Defaults and Lessons from a Decade of Crises*, Cambridge, MA: The MIT Press, 2007.

[3] Carmen Reinhardt and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*, Princeton, NJ: Princeton University Press, 2009.

Severity and impact of deleveraging

To better understand how deleveraging might play out in the future, we focused on the 32 deleveraging episodes that followed a financial crisis. Exhibit B.2 summarizes the duration[4] of the deleveraging episodes by archetype, as well as the extent of deleveraging in terms of the relative and absolute decrease of total debt to GDP.

Exhibit B.2

Duration and extent of deleveraging following a financial crisis

	Archetype	Number of episodes	Duration[1] years	Extent of deleveraging Debt / GDP change %	pp	Debt CAGR[4] Trend vs. Episode[3]
❶	**"Belt-tightening"**	16	6-7	-29	-40	21 vs. 2
		Median	5	-24	-34	21 vs. 3
❷	**"High inflation"**	8	7	-53	-93	50 vs. 46
		Median	8	-62	-34	36 vs. 27
❸	**"Massive default"**	7	6	-36	-46	41 vs. 10
		Median	8	-55	-72	28 vs. 9
❹	**"Growing out of debt"**	1	6	-25	-44	0 vs. 12
	Total[2]	**32**	**6-7**	**-37**	**-54 pp**	**32 vs. 14**

1 Duration is defined as the period during which debt/GDP levels decrease.
2 Two outliers have been removed from the averages: Turkey 87-03, Poland 87-95.
3 Historic trend defined as the 10 years or longest time series available before the start of the deleveraging episode.
4 Compound annual growth rate.
Note: Averages remain similar when including episodes of deleveraging not induced by a financial crisis.

SOURCE: International Monetary Fund; McKinsey Global Institute

The belt-tightening episodes, constituting the most common archetype, last on average six to seven years. The median decline in debt to GDP is 25 percent. The growth rate of credit slows to just 2 percent per year, compared with 21 percent annual growth in the years leading up to the crisis.

The annual real GDP growth during the deleveraging episodes of each archetype can be found in Exhibit 29 of the main section of this report. A sharp reduction in credit growth has been associated with declining real GDP in the first two to three years of deleveraging. Interestingly, we find that deleveraging typically begins about two years after the start of a financial crisis and economic recession—just where the United States and Europe are as we write this report. In every episode we examined, GDP growth declined in the early years of the process but then rebounded strongly and grew for the next four to five years while deleveraging continued. In the belt-tightening episodes, credit growth also resumed in the later years, although more slowly than GDP, allowing for further deleveraging.

Tables 2.1 to 2.4 list the deleveraging episodes identified in our analysis.

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[4] Duration is defined as the period during which debt-to-GDP levels decrease.

Table 2.1 - Historic deleveraging episodes, "belt-tightening" archetype

	Deleveraging period			**Total debt/GDP**			
Country	**Start**	**End**	**Financial crisis**	**Start, %**	**End, %**	**Relative change, %**	**Absolute change, percentage points of GDP**
Bolivia	1998	2008	yes	68	34	-50	-34
Costa Rica	1965	1969	yes	32	26	-18	-6
Denmark	1989	1997	yes	234	214	-10	-20
Ecuador	1984	1989	yes	24	12	-48	-12
Ecuador	2000	2003	yes	82	35	-57	-47
Finland	1991	1998	yes	108	74	-32	-35
S. Korea	1998	2000	yes	265	234	-12	-31
S. Korea	1985	1988	yes	173	138	-20	-35
Malaysia	1998	2008	yes	272	229	-16	-43
Paraguay	1997	2004	yes	32	18	-42	-14
Philippines	2003	2007	yes	128	93	-27	-35
South Africa	1988	1997	yes	181	129	-29	-52
Sweden	1993	2000	yes	193	176	-10	-17
Thailand	1997	2000	yes	196	163	-16	-33
UK	1947	1980	yes	286	110	-62	-176
US	1933	1937	yes	258	171	-34	-87
Belgium	1997	2004	no	150	98	-34	-52
Canada	1998	2005	no	242	217	-10	-25
Chile	2002	2006	no	135	102	-25	-33
Egypt	2002	2007	no	91	78	-14	-13
Ireland	1988	1994	no	183	145	-21	-38
Nigeria	2001	2005	no	49	30	-38	-19
Switzerland	1969	1974	no	135	101	-25	-34

Source: International Monetary Fund; C. Reinhart and K. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

Table 2.2 - Historic deleveraging episodes, "high inflation" archetype

	Deleveraging period			**Total debt/GDP**			
Country	**Start**	**End**	**Financial crisis**	**Start, %**	**End, %**	**Relative change, %**	**Absolute change, percentage points of GDP**
Chile	1984	1991	yes	132	86	-35	-46
Costa Rica	1987	1995	yes	41	19	-55	-22
Greece	1989	1998	yes	80	62	-22	-18
Poland	1987	1995	yes	1211	51	-96	-1160
Romania	1990	2000	yes	351	17	-95	-334
Spain	1976	1980	yes	120	106	-12	-14
Ukraine	1993	1996	yes	31	9	-70	-22
Uruguay	1984	1994	yes	230	38	-84	-192
Italy	1975	1981	no	240	181	-25	-59
Nigeria	1986	1991	no	43	18	-58	-25
Paraguay	1983	1987	no	19	13	-31	-6
Portugal	1983	1990	no	106	70	-34	-36

Source: International Monetary Fund; C. Reinhart and K. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

Table 2.3 - Historic deleveraging episodes, "massive default" archetype

	Deleveraging period			Total debt/GDP			
Country	**Start**	**End**	**Financial crisis**	**Start, %**	**End, %**	**Relative change, %**	**Absolute change, percentage points of GDP**
Argentina	2002	2008	yes	181	64	-65	-117
Indonesia	2000	2008	yes	97	55	-43	-42
Mexico	1982	1992	yes	383	65	-83	-318
Russia	1997	2001	yes	86	39	-55	-47
Turkey	1987	2003	yes	25371	92	-100	-25279
US	1929	1933	yes	160	258	61	98
Uruguay	2002	2005	yes	136	65	-53	-71

Source: International Monetary Fund; C. Reinhart and K. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

Table 2.4 - Historic deleveraging episodes, "growing out of debt" archetype

	Deleveraging period			Total debt/GDP			
Country	**Start**	**End**	**Financial crisis**	**Start, %**	**End, %**	**Relative change, %**	**Absolute change, percentage points of GDP**
US	1938	1943	yes	180	136	-25	-44
Egypt	1975	1979	no	46	40	-14	-6
Nigeria	1968	1971	no	15	8	-48	-7

Source: International Monetary Fund; C. Reinhart and K. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

B. A DETAILED DISCUSSION OF SEVEN CASE STUDIES OF DELEVERAGING

In the following, we discuss in detail seven historic episodes of deleveraging:

1. The US Great Depression, 1929–43
2. United Kingdom, 1947–80
3. Finland, 1991–98
4. Malaysia, 1998–2008
5. Mexico, 1982–92
6. Argentina, 2002–08
7. Spain, 1976–80

1. The US Great Depression, 1929–43

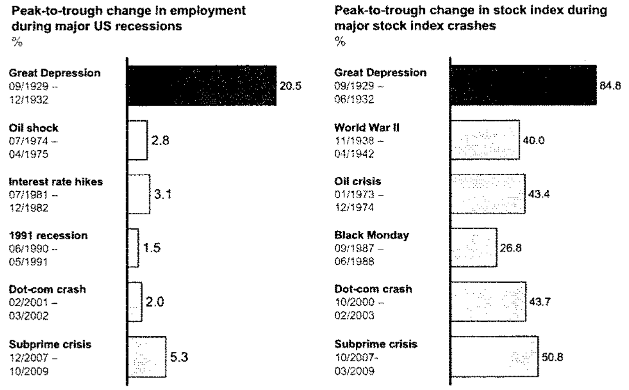
The Great Depression was the most severe financial crisis in modern times, resulting in a deleveraging process that stretched over more than a decade and fit three different archetypes—a phase of defaults, followed by belt-tightening, and eventually a wartime economic boom that caused the economy to grow out of debt.

The first phase of deleveraging from 1929 to 1933 was a rare instance in which the nominal stock of debt declined.[5] Total debt fell by $20 billion to $145 billion as households and businesses defaulted on their loans. However, GDP fell much faster, causing the nation's ratio of total debt to nominal GDP to *rise* from 160 percent to 258 percent. The US Federal Reserve's contractionary monetary policies of the time triggered severe deflation, which turned a postcrisis recession into the Depression. The US consumer price index fell 25.8 percent from 1929 to 1933. As prices fell, households stopped spending, banks failed or simply stopped lending, bankruptcies multiplied, unemployment soared, and overall economic activity nearly came to a standstill (Exhibit B.3). Real GDP dropped 26.7 percent during the period, and with deflation, nominal GDP fell by 46 percent. Defaults during this period soared: the default rate on urban mortgages reached around 50 percent by 1934. It was not until 1934, when GDP growth resumed, that the ratio of debt to GDP began to decline (Exhibit B.4).

From 1933 to 1937, the economy deleveraged through austerity or belt-tightening. During this period, credit began to grow again but only very slowly, at just 1 to 3 percent per year in nominal terms. Expansionary monetary and fiscal policies ended deflation and spurred a very strong economic rebound in the mid-1930s. Real GDP, which had fallen for four years straight, rose by 11 percent in 1934, and kept rising rapidly through 1937. Unlike modern deleveraging episodes in Scandinavia and Asia, net exports played no material role in supporting GDP growth. Instead, private consumption and investment rebounded. With inflation revived, nominal GDP rose even faster. Thus, the debt-to-GDP ratio fell by 78 percentage points to 180 percent by 1937. Most of this drop came from deleveraging by nonfinancial businesses, but the government and households also continued to lower their debt-to-GDP levels.

Exhibit B.3

Employment and wealth losses in the Great Depression



SOURCE: Bureau of Labor Statistics; McKinsey Global Institute

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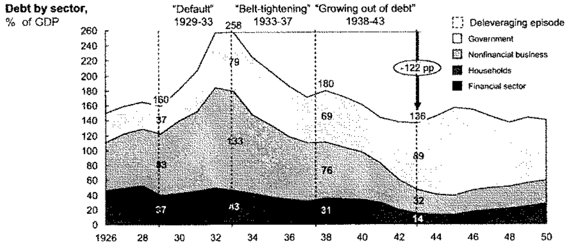
[5] In most deleveraging episodes, credit grows more slowly than GDP, reducing the ratio of debt to GDP, but the stock of debt does not decline.

Exhibit B.4

The Great Depression deleveraging occurred in 3 distinct phases: massive default, belt-tightening, and high growth



Real GDP and debt growth

Real GDP growth,%	7	1	1	6	-9	-6	-13	-1	11	9	13	5	-3	8	9	17	18	16	8	-1	-11	-1	4	-1	9
Debt growth, %	4	5	5	3	0	-5	-4	-4	2	2	3	1	-1	2	4	11	22	21	18	10	-2	4	4	4	7

SOURCE: Haver Analytics; Historical Statistics of the United States; Census Bureau; McKinsey Global Institute

The third phase of deleveraging, from 1938 through 1943, was driven by a wartime economic boom. Unfortunately, a poorly timed tightening of both monetary policy and fiscal policy caused a brief recession in 1938 and a small rise in the economy's debt-to-GDP level. Policy makers quickly reversed course and the recovery resumed in 1939, gaining momentum as the United States became increasingly involved in World War II. US real GDP grew by 16 percent or more per year in 1941 through 1943. The government's debt to GDP, not surprisingly, rose 20 percentage points to 89 percent to finance the war effort. But this was more than offset by continued deleveraging by households and nonfinancial corporations. Thus, from 1939 through 1943, total US debt to GDP fell 35 percentage points to 136 percent. This time, in contrast to deleveraging of the first phase, credit started growing rapidly, but GDP grew even faster, causing the ratio of debt relative to GDP to decline.

Economists have drawn many different lessons from the experience of the Depression in the United States.[6] For the purposes of this report, we see two lessons for deleveraging worth highlighting. First, government policy makers must be careful not to cut back on monetary or fiscal stimulus measures too soon, lest they snuff out a nascent recovery, as occurred in 1938. Second, the right government policies are also critical to maintaining public confidence so that deflation will not occur. If households and businesses think deflation is a real possibility, they will hold off on spending and investment, possibly causing deflation to take hold and economic activity to fall off, which causes debt-to-GDP ratios to soar. The policy mistakes that caused deflation in the early 1930s and a recession in 1938 prolonged the Depression and made the deleveraging process that much more painful.

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6 See, for instance: Christina D. Romer, "*Lessons from the Great Depression for the Economic Recovery in 2009*," Presentation at the Brookings Institution, March 2009; and John Kenneth Galbraith, *The Great Crash of 1929*, Rev. ed., Boston: Houghton Mifflin Co., 1997 (original 1954).

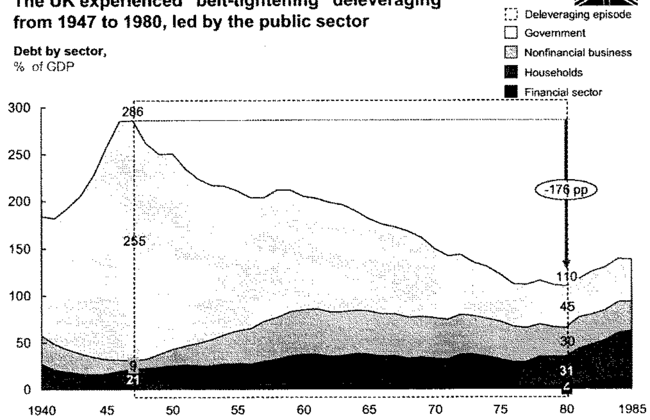
2. United Kingdom, 1947–80

After World War II, UK policy makers faced the challenge of repaying the large national debt accrued during the war. By reducing the fiscal deficit and slowing the growth of nominal credit, the UK economy underwent a three-decade period of significant deleveraging through the belt-tightening archetype. Total debt relative to GDP declined from 286 percent in 1947 to 110 percent by 1980 (Exhibit B.5). Among the deleveraging episodes in our sample, the UK case is notable both for the duration and magnitude of the deleveraging. And as in many belt-tightening episodes, moderately high inflation over some periods also played a role.

Real economic growth during this period of deleveraging was relatively slow (Exhibit B.6) and the United Kingdom underperformed relative to its peers. For instance, annual real GDP growth averaged 2.6 percent over 1948 to 1980 in the United Kingdom, compared with 3.7 percent in the United States over the same period and compared with 2.9 percent in the United Kingdom over 1981–2000. While many factors can be linked to this period of lackluster economic performance, the burden of high government debt certainly contributed to the economy's underperformance. By suppressing the growth and efficient allocation of credit, and by necessitating high levels of taxation, the burden of high government debt weighed on the UK economy.

Exhibit B.5

The UK experienced "belt-tightening" deleveraging from 1947 to 1980, led by the public sector



SOURCE: HM treasury, Office of national statistics, McKinsey Global Institute analysis

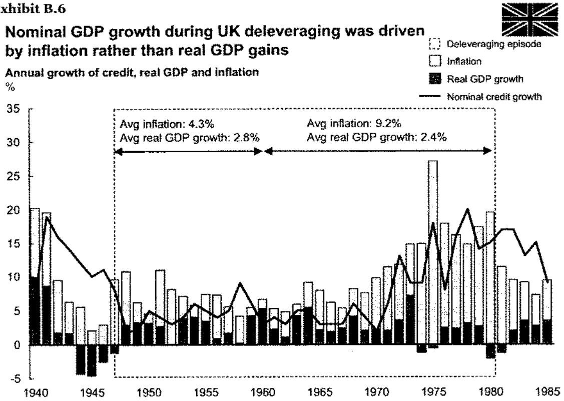
Deleveraging occurred solely in the government sector, with public debt declining from 255 percentage points of GDP to 45 points over the period. A strict schedule of repayments imposed by creditors after the war forced the UK government onto a prolonged path of fiscal austerity. Balanced budgets, facilitated by a rapid drop in spending and maintenance of wartime tax rates, resulted in a stabilization of the level of nominal debt. Meanwhile, nominal GDP growth rose quickly because of moderately high inflation. As a result, the ratio of debt to GDP fell over time.

Private sector debt grew rapidly in the decade after the war, even as the ratio of total debt to GDP fell. The easing of wartime restrictions on investment, consumption, and

Exhibit B.6

Nominal GDP growth during UK deleveraging was driven by inflation rather than real GDP gains

Annual growth of credit, real GDP and inflation
%



SOURCE: McKinsey Global Institute

credit allocation spurred robust private debt growth from 1948 through 1960, causing a rebound in demand for housing, consumer durables, and capital investments. Banks were flush with deposits during this period, as high taxation rates increased the attractiveness of tax-free savings instruments such as bank deposits and building society shares. Nonfinancial business debt relative to GDP rose from 9 percent in 1947 to 30 percent in 1960, while household debt to GDP increased from 21 percent to 31 percent.

The private credit expansion slowed between 1960 and 1980, keeping pace with nominal GDP growth. High inflation was a significant problem during this period because of a combination of higher commodity prices, poor management practices, inflexible labor markets, and strong unions, leading to low productivity in many sectors of the economy. Policy makers responded by restraining private sector credit growth in an attempt to reduce private demand and inflation. Inflation also enabled deleveraging, as it eroded the real value of the existing stock of debt and dampened the supply of credit from banks. The impact of high inflation and government controls in the financial sector, combined with a more general economic malaise, severely restricted private sector debt growth.

During much of this period, the United Kingdom had an overvalued exchange rate. Sterling was set at $4.03 under Bretton Woods. The UK government progressively devalued the currency during the 1950s and 1960s, but not at a pace sufficient to maintain the United Kingdom's competitiveness given its high inflation rates. The United Kingdom suffered a major currency crisis in the mid-1970s, when international investors lost confidence in the government's ability to control its fiscal position. By 1980, Sterling had fallen to $2.32, and by 1985 to $1.28. The overvalued exchange rate limited the United Kingdom's ability to grow net exports to support GDP growth during deleveraging.

The United Kingdom's deleveraging experience from 1947 through 1980 demonstrates how governments can deleverage over long periods of time through belt-tightening. The economic cost however, was lower real GDP growth, which had a significant human cost in terms of living standards.

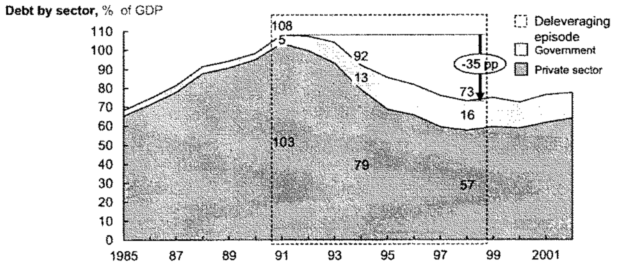
3. Finland, 1991–98

Finland's experience represents a classic example of a credit-fueled asset bubble followed by a crash, and deleveraging through the "belt-tightening" archetype. This episode also illustrates how a financial crisis and deleveraging can occur even in countries with relatively modest levels of debt to GDP. Finland's crisis began in the early 1990s, after its ratio debt to GDP peaked at 108 percent of GDP—a level far below that of the most leveraged major economies today. The crisis and subsequent recession were severe nonetheless. A key element of Finland's deleveraging process was the government's aggressive response to the crisis, which boosted net exports and laid the foundation for a strong economic recovery.

Finland's credit boom began in the 1980s when the government moved to liberalize the country's financial system. New measures, phased in over time, relaxed interest rate controls, allowed variable-rate loans, loosened mortgage lending requirements, and opened the doors to foreign borrowing by corporations and households. Finland's total credit grew at a 15 percent compound annual rate from 1986 to 1991, causing its debt-to-GDP ratio to rise by 44 percent, from 75 percent of GDP to 108 percent (Exhibit B.7).

Exhibit B.7

Finland experienced "belt-tightening" deleveraging in the 1990s, led by the private sector



Real GDP and debt growth

Real GDP growth, %	3	2	3	4	5	0	-6	-4	-1	4	5	4	6	5	4	5	3	2
Debt growth, %	20	16	18	27	15	11	6	-3	-3	-6	2	-1	0	5	7	5	11	5

SOURCE: International Monetary Fund; McKinsey Global Institute Capital Markets database; European Commission Economic Paper 350, *The great financial crisis in Finland and Sweden*, Dec 08

Rapid credit growth resulted in asset bubbles in both real estate and equity markets. Finnish home prices rose 80 percent during the late 1980s, while equity prices tripled.

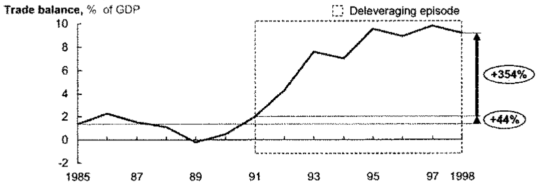
But the rapid expansion of credit and the monetary base eventually sparked inflation. This eroded Finland's export competitiveness. At the same time, the disintegration of the Soviet Union curtailed Finland's exports. Finland's current account deficit soared, prompting the Finnish central bank to dramatically tighten monetary policy in 1990. The real short-term interest rate went from 2 percent to 12 percent in two years. Household and nonfinancial corporate borrowers with variable loans were hit hard, and their real debts increased as asset prices began to fall. House prices fell by 50 percent, and the Helsinki stock market index declined by 70 percent.[7] Defaults soared, creating credit losses for the banking system. The economy fell into a deep recession from the third quarter of 1990 through the second quarter of 1993. GDP declined by 13.3 percent during the period, while the unemployment rate soared from 5 percent to 18 percent. This episode, often called a depression, was much worse than the current US recession so far, in which real GDP has declined by 3.7 percent and unemployment has risen to 10 percent.

The deleveraging period in Finland began in 1991, more than one year after GDP peaked, and lasted until 1998. Total debt to GDP fell by almost a third, to 73 percent. In the early years, Finland's stock of nominal credit shrank. Households saved more and paid down debt, and nonfinancial corporations increased net saving by sharply reducing investment. Some debt was erased as bankruptcies soared. Overall private debt to GDP fell from 103 percent to 57 percent during these years.

Finland's public debt more than doubled between 1991 and 1994, from 5 percent of GDP to 13 percent, as the government moved aggressively to stabilize the financial system and the economy. The Finnish government guaranteed bank deposits and took stakes in financial corporations at risk of bankruptcy. Finland's currency at the time, the markka, declined in real terms by 27 percent in those years, which led to a surge in net exports.[8] These actions succeeded in fueling a strong economic rebound. This resulted in the second phase of deleveraging, from 1994 through 1998, in which credit started to grow again haltingly, but the economy grew much

Exhibit B.8

The deleveraging in Finland was driven by a surge in net exports



Evolution of components of GDP, % change

	Upswing 1985-90	Crisis 1990-93	Recovery 1993-98
Private consumption	19.6%	-11.0%	21.4%
Public consumption	17.5%	-6.6%	12.1%
Private investments	27.8%	-47.0%	47.6%
Exports	10.2%	19.3%	61.6%
Imports	33.0%	-11.8%	56.1%
GDP	**17.7%**	**-13.3%**	**25.7%**

SOURCE: International Monetary Fund, McKinsey Global Institute Capital Markets database, European Commission Economic Paper 350, *The great financial crisis in Finland and Sweden*, Dec 08 faster—causing the ratio of debt to GDP to fall. Finland's economic growth in this period was driven primarily by rising exports; real domestic demand recovered slowly and did not return to its precrisis level until 1999 (Exhibit B.8). Overall, the nation's debt-to-GDP ratio fell by 16 percentage points in the first phase of deleveraging, and by a bit more, 19 points, in the second phase. Another positive effect during this deleveraging process was a swing in Finland's trade balance from a precrisis deficit to a considerable postcrisis surplus.

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[7] See Jaakko Kiander and Pentti Vartia, "Lessons from the crisis in Finland and Sweden in the 1990s," Conference on the Aftermath of the Financial Crisis, Austrian National Bank, Vienna, November 5-6, 2009.

[8] During this period, foreign bank lending went from positive inflows to negative outflows, reflecting foreign lenders withdrawing credit from Finland. This pattern of volatile foreign lending was repeated in all of the Southeast Asian nations hit by the 1997 financial crisis. See Martin Baily, Diana Farrell, and Susan Lund, "The color of hot money," *Foreign Affairs*, March/April 2000, Volume 79, Number 2.

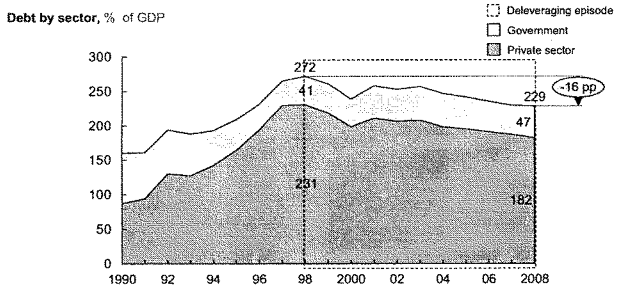
Among the lessons of Finland's experience was the critical role played by the government's policy response. It proved key to restoring confidence, reviving private investment, and generating the economic rebound that made the deleveraging process much easier in the later years. Public debt continued to grow throughout the deleveraging period, although it was only 5 percent of the size of private debt at the start of the crisis. In addition, Finland demonstrates the important role that exports can play in supporting GDP growth while private consumption and investment decline during deleveraging.

4. Malaysia, 1998–2008

Malaysia provides an example of a decade of sustained, gradual deleveraging according to the "belt-tightening" archetype. Malaysia's deleveraging episode began after the Asian financial crisis of 1997–98. The following slowdown in credit growth and rebound in economic growth, chiefly due to rising net exports, brought Malaysia's debt-to-GDP level down from a peak of 272 percent in 1998 to 229 percent in 2008 (Exhibit B.9). Malaysia's deleveraging process was not as dramatic and painful as Finland's, as it was achieved instead by allowing only modest credit growth even as real GDP growth rebounded.

Exhibit B.9

The deleveraging of the private sector in Malaysia started in 1998 and is still ongoing at a slow pace



Real GDP and debt growth

Real GDP growth, %	9	10	9	10	9	10	10	7	-7	6	9	1	5	6	7	5	6	6	5
Debt growth, %	4	14	34	11	16	23	26	27	3	2	8	7	6	11	9	8	7	9	15

SOURCE: International Monetary Fund; Bank of Malaysia; Haver Analytics; McKinsey Global Institute

Government actions to liberalize Malaysia's financial system in the late 1980s and early 1990s led to a large influx of foreign capital. Private sector borrowing grew rapidly, averaging a 30 percent growth rate from 1990 to 1997. Much of the credit came from smaller regional banks and finance companies and went into real estate, sparking a commercial property bubble. Malaysia's nascent equity market tripled in value over the period. The collapse of the Thai baht and ensuing financial crisis caused investors to scrutinize Malaysia's position as well, and its currency, the ringgit, also depreciated sharply. This triggered a banking crisis and economic recession in 1998. Nonperforming loans soared to between 25 and 35 percent of banking system assets. Real estate prices fell by 19 percent, and the stock market lost more than two-thirds of its value. GDP swung from a 7 percent increase in 1997 to a 7 percent contraction in 1998.

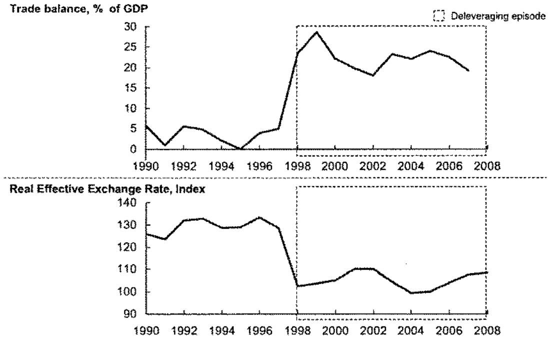
The Malaysian government instituted several measures that stabilized the financial and economic sectors. First, the government lowered interest rates and bank reserve requirements to encourage credit and prevent more defaults on variable-rate loans. Second, the government established an asset management company to assume bad debts of banks and placed blanket guarantees on deposits, while the financial sector was restructured through mergers, recapitalization, and nationalizations. Finally, the government imposed capital controls limiting international trade in the ringgit and Malaysian assets and fixed the exchange rate to the US dollar. The latter measure was defended as necessary to prevent the country from defaulting on foreign debt and to allow the central bank to control interest rates without worry of foreign capital flow responses.

Unlike Finland, the stock of debt did not decline in Malaysia. Instead, credit growth fell sharply from annual rates in the 20 percent range during the credit bubble to a low of 2 percent in 1999. The Malaysian government encouraged a revival of credit growth after the crisis by lowering the banks' capital reserve requirements and encouraging them to lend, which helped increase private spending. But the government also oversaw a major restructuring of the financial sector, with the number of finance companies falling from 39 to just 10. In addition, the government forced consolidation of two insolvent banks assets that accounted for 14 percent of banking system assets. This sharply slowed the precrisis rate of debt growth, with credit expanding at a more modest pace of around 8 percent per year from 1998 to 2008.

GDP growth was supported during deleveraging by an increase in net exports (Exhibit B.10). Malaysia's trade surplus jumped from below 5 percent in 1996 to

Exhibit B.10

Malaysia's GDP growth was supported by rising exports after devaluation of the currency



SOURCE: International Monetary Fund; Bank of Malaysia; Haver Analytics; McKinsey Global Institute above 20 percent in 1998, where it has stayed almost continuously since. Real GDP growth rebounded to an average pace of 6 percent per year since 1999. As a result, the Malaysian private sector debt has shrunk from 231 percent of GDP in 1998 to 182 percent in 2008, driven almost entirely by financial institutions and nonfinancial corporations.[9]

Malaysia demonstrates the possibility of slow, sustained deleveraging over time through a classic belt-tightening approach. In this case, both credit growth and GDP growth resumed, but at slower paces than before the crisis. Net exports played an important role in supporting GDP growth, as in Finland.

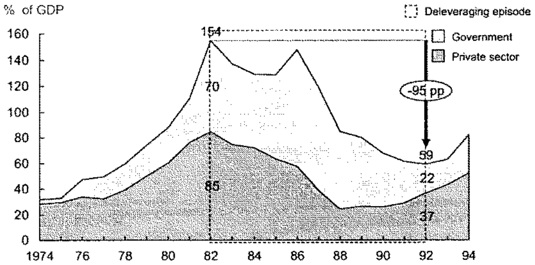
5. Mexico, 1982–92

Mexico's sovereign default in 1982 triggered significant deleveraging through the "massive default" archetype. Like many crises over this period, banking, currency, and inflation crises accompanied the Mexican sovereign debt default. The scale of deleveraging in Mexico was dramatic: the ratio of total debt to GDP fell from 154 percent in 1982 to 59 percent in 1992—a decline of two-thirds (Exhibit B.11). Both the public and private sectors deleveraged during this period: government debt to GDP dropped from 70 percent to 22 percent, while private debt to GDP fell from 85 to 37 percent of GDP (hitting a low point of 24 percent in 1988). Real GDP growth remained weak during deleveraging, averaging just 1.6 percent annually over a period some have termed "the lost decade."

Exhibit B.11

Mexico defaulted on its government debt in 1982, leading to 10 years of deleveraging

Debt by sector,[1] % of GDP



Real GDP and debt growth

Real GDP growth,%	6	6	4	4	9	10	9	9	-1	-4	3	2	-4	2	1	4	5	4	4	2	4
Debt growth, %	19	13	66	62	52	63	74	72	123	62	55	60	91	97	54	25	13	16	15	19	48
Inflation, %	24	15	16	29	17	18	26	28	59	102	66	58	86	132	114	20	27	23	16	10	7

1 Some figures do not sum due to rounding.

SOURCE: International Monetary Fund; Bank of Mexico; Haver Analytics; McKinsey Global Institute

By the late 1970s, spurred by high oil prices, the Mexican economy was experiencing robust growth with average real GDP growth of 7.2 percent per year over 1972-81. After several major oil finds in 1976, Mexico's borrowing accelerated, mostly to build the country's oil industry infrastructure. A significant source of funding was through US and other foreign commercial banks, which provided loans largely denominated in US dollars (Exhibit B.12). This lending was fueled in part by the recycling of surplus funds from other oil-exporting countries: they provided deposits to major developed market banks, which in turn loaned the funds to emerging market governments, particularly in Latin America. Both government and private sector borrowing climbed in Mexico, with total debt to GDP rising from 31 percent in 1975 to 110 percent in 1981. Government debt increased from 1 percent to 34 percent of GDP, while private sector credit grew from 30 percent to 76 percent of GDP over the period.

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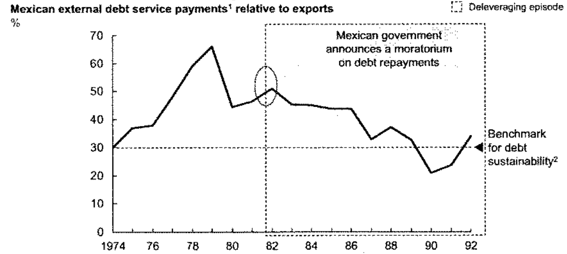
[9] Malaysia, unlike the other economies we examined closely, does not provide data allowing for a more detailed breakdown of private sector debt by households, financial institutions, and nonfinancial corporations.

Exhibit B.12

Prior to Mexico's sovereign default in 1982, its external debt service burden was rising

Mexican external debt service payments[1] relative to exports



External debt										
% of total debt	53	58	61	40	34	43	53	64	69	52
% of GDP	19	27	35	29	50	54	78	54	40	31

[1] Debt service payments include principal and interest payments on long-term debt, interest paid on short-term debt, and repayments to the IMF.

[2] See, for instance, Chapter 5, *History of the eighties – Lessons for the Future*, FDIC.

SOURCE: International Monetary Fund; Haver Analytics; McKinsey Global Institute

Mexico's external debt rose from $16 billion in 1975 to $86 billion in 1982, tripling in real terms. The external debt, equal to 50 percent of GDP, required debt service payments worth 51 percent of exports—very high by international standards (Exhibit B.12). Adding to the vulnerability of its external position, much of Mexico's external debt was dollar-denominated and pegged to short-term interest rates, such as the six-month London interbank offered rate. In 1982 several factors combined to trigger Mexico's external debt crisis. Falling oil prices in the early 1980s dampened an important source of Mexican exports and foreign exchange. Simultaneously, US interest rates rose dramatically as the Federal Reserve fought to combat inflation. In August 1982, the government suspended payments on its external debt and a balance of payments crisis ensued, which forced the devaluation of the peso. As the economy entered a deep recession, aggregate debt-to-GDP levels peaked at 154 percent.

In the wake of the debt crisis, both capital inflows and domestic credit expansion slowed dramatically in real terms. Nominal GDP grew rapidly as inflation soared with the devaluation of the peso. By 1987 inflation peaked at 132 percent, having averaged 19 percent in the years preceding the crisis. Fixed investment fell sharply as interest rates rose, exacerbating the recession and leading to a weak recovery in real GDP over subsequent years. From 1983 to 1992, real annual GDP growth averaged just 1.9 percent, compared with 7.2 percent in the ten years prior to the crisis. Strong nominal GDP growth, combined with weak credit growth resulted in significant overall deleveraging, with total debt to GDP falling to 59 percent by 1992. The deleveraging was widespread, with both the private sector and government sector each accounting for half of total deleveraging.

By 1990, robust economic growth had returned to Mexico driven by a recovery in credit availability and strong export growth. Once again, however, external debt grew as Mexico began to borrow heavily from abroad. Triggered by disruptions in the political environment, Mexico slipped into another debt crisis in 1994.

Mexico's deleveraging episode illustrates the dangers of mismatches in the currency and maturity structure of debt financing. Despite levels of government debt that were low (34 percent of GDP) by developed markets standards, the Mexican government became overwhelmed as creditors' fears quickly spiraled into debt crises. Mexico's experience also illustrates how government defaults can lead to inflation and banking crises, which may further dampen credit by suppressing the supply of private credit from domestic sources.

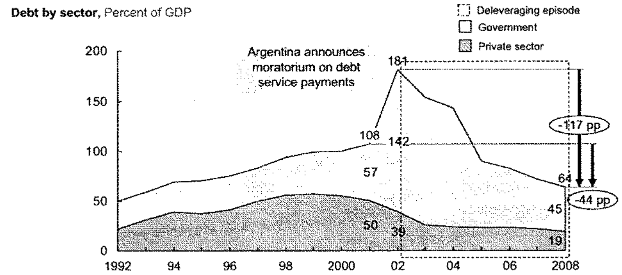
6. Argentina, 2002–08

Argentina is an example of deleveraging through the "massive default" archetype. It is also a case in which the nominal stock of debt declined. Like Finland, the Argentine episode also illustrates how deleveraging can occur even when total debt levels in the economy are not very high. Argentina's public debt was just 57 percent of GDP, much of it denominated in US dollars, when the government defaulted in 2001. This sparked a sharp currency devaluation and deep recession, causing the ratio of public debt to GDP to jump to 142 percentage points. Since then, both the public sector and private sector debt has declined significantly (Exhibit B.13) as the country was cut off from international capital markets.

Exhibit B.13

Argentina's sovereign default triggered substantial deleveraging

Debt by sector, Percent of GDP



Real GDP and debt growth

Real GDP growth,%	10	6	6	-3	6	8	4	-3	-1	-4	-11	9	9	9	8	9	7
Debt growth, %	22	24	26	2	13	18	15	0	1	2	96	2	11	-26	13	8	14

SOURCE: International Monetary Fund; Bank of Argentina; Haver Analytics; McKinsey Global Institute

In retrospect, the seeds of instability began in 1991, when the Argentine government decided to fight hyperinflation by permanently pegging its currency, the peso, to the US dollar. Under this system, called "convertibility," the central bank guaranteed that one peso was worth $1 and that the exchange rate would not change. Citizens used the two currencies interchangeably, often borrowing in dollars even though salaries were paid in pesos. The initial result was a period of relative economic stability and strong real GDP growth, which averaged 6 percent a year from 1991 to 1998. The country's debt relative to GDP doubled during these years as credit expanded to fuel growth, reaching 100 percent of GDP by 1999, primarily because of rising private sector borrowing.

However, the fatal flaw of the currency peg was that the peso rose along with the dollar, which appreciated rapidly the late 1990s as the US economy boomed, the dot-com craze peaked, and the Asian financial crisis of 1997–98 sent money flowing into the safety of US Treasuries. The peso became increasingly overvalued, hurting Argentina's exports and industry. But the country clung to the currency peg for many reasons, including the fact that a devaluation would make it much more difficult for all Argentines—the government, businesses, and households— to service their dollar loans.

By the late 1990s, the currency peg was becoming increasingly untenable. As the contagion from the Asian crisis spread, Russia defaulted on part of its public debt in 1998, causing international investors to shift their money out of many emerging markets. The turmoil spread to Brazil, forcing it to devalue its currency in 1999. This attracted foreign investors away from Argentina to Brazil, and further depressed Argentina's exports—33 percent of Argentina's trade was with Brazil.

As Argentina's economy fell into recession in 1999, private sector debt to GDP started falling and government borrowing picked up. Investors' concerns about the country's ability to service its debt started to increase as well, causing interest rates to rise, which deepened the recession. As conditions worsened, Argentines started pulling their savings out of banks and transferring them abroad—a trend that accelerated into a full-fledged bank run in late 2001. The government responded by imposing strict limits on bank withdrawals and transfers, crippling many households' and businesses' ability to pay their bills. The economy was seizing up. The IMF refused to disburse additional funds. On December 30, 2001, Argentina's government announced it would suspend payments on its foreign debt, initiating one of the largest sovereign default ever recorded. Four days later, the government abandoned the currency peg, sending the peso into a sharp devaluation.

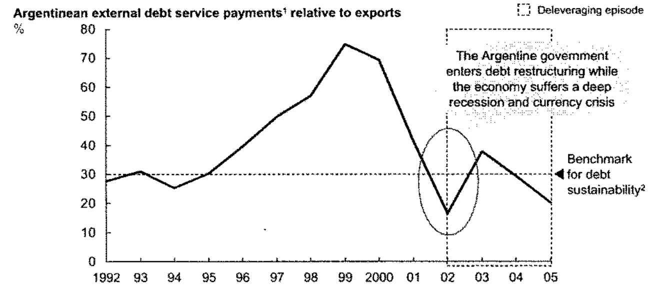
With Argentina's currency depreciating, the cost of servicing dollar-denominated debt soared (Exhibit B.14). The economy contracted by 11 percent, and the value of Argentina's debt relative to GDP soared to 181 percent in 2002. The economy has been deleveraging ever since. The government announced an offer to creditors to exchange bonds for just one-quarter of their face value in 2005—an offer that three-quarters of creditors accepted. Public debt has fallen from 142 percent of GDP in 2002 to 45 percent in 2008. But the government default hurt private borrowers as well. Private sector debt to GDP also shrank over the same period, from 39 percent of GDP to 19 percent, through defaults and reductions in bank lending.

The process was undeniably painful—both inflation and unemployment rose above 20 percent in 2002. But by 2003, the lower peso was spurring exports and tourism, causing the economy to expand again. Helped as well by the commodity boom that began in 2002, Argentina's GDP growth has averaged just above 8 percent a year since then. Beyond the export industries, however, lack of credit has constrained investment. At just 64 percent of GDP, Argentina's level of debt is much below that of the fast-growing developing economies. Consumers, small businesses, and even some large domestic companies are credit-constrained.

Exhibit B.14

Argentina had a large foreign currency debt, which became unsustainable after devaluation

Argentinean external debt service payments[1] relative to exports



External debt																
% of total debt	N/A	N/A	60	46	42	54	54	52	50	50	50	51	85	81	75	79
% of GDP	46	36	30	28	30	39	42	44	48	51	51	57	153	132	113	71

1 Debt service payments include principal and interest payments on long-term debt, interest paid on short-term debt, and repayments to the IMF.

2 See for, instance, Chapter 5, *History of the eighties – Lessons for the Future*, FDIC.

SOURCE: Haver Analytics; International Monetary Fund; McKinsey Global Institute

Like Mexico, Argentina illustrates the risks of foreign currency debt coupled with an unsustainable currency valuation. It also demonstrates the pain to private borrowers in the event of a sovereign default. And it reflects the fact that, in determining sustainability, the level of debt matters less than the ability to service the debt. While default is surely one way to deleverage, the human costs show it is a path that is best to avoid.

7. Spain, 1976–80

Spain's experience in the post-Franco years is an example of deleveraging through high inflation. It is also a case in which deleveraging was accompanied by—not caused by—a banking crisis. The country's debt-to-GDP ratio fell from 120 percent in 1976 to 106 percent in 1980. The deleveraging occurred almost completely in the private sector, which reduced its debt relative to GDP from 105 percent to 92 percent over that period (Exhibit B.15).

As in many mature economies in the late 1970s, Spain's inflation rate rose from a combination of factors, including loose monetary policy and soaring oil prices. General Francisco Franco's death in November 1975 left a power vacuum in Spain. The country adopted expansionary monetary policies, causing inflation to rise from an average of 13 percent a year from 1972 through 1975 to a peak of 25 percent in 1977 (Exhibit B.16). After that, monetary policy and was tightened and inflation brought down to 16 percent by 1980. But inflation boosted Spain's nominal GDP growth, which increased from 19 percent per year from 1972 through 1975 to 21 percent per year from 1976 through 1980.

At the same time, the country experienced a major banking crisis. From 1978 to 1983, the government rescued, consolidated, or nationalized 52 of the country's 100 banks, representing 20 percent of deposits.[10] Credit growth slowed during the deleveraging between 1976 and 1980, falling from 23 percent in the early 1970s to 19 percent during deleveraging.

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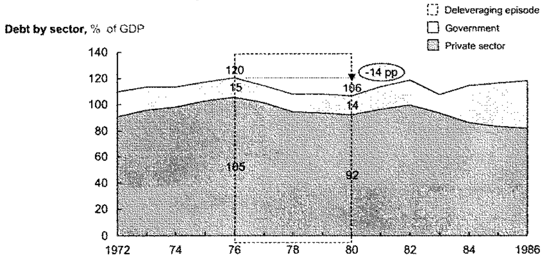
[10] See Carmen Reinhart and Kenneth Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*, Princeton, NJ: Princeton University Press, 2009.

Exhibit B.15

Spain experienced deleveraging through inflation during its transition to democracy from 1976 to 1980



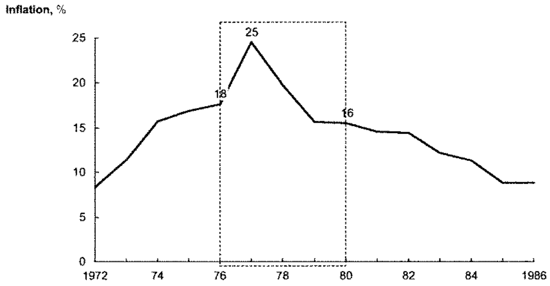
Real GDP and debt growth

	1972	73	74	75	76	77	78	79	80	81	82	83	84	85	1986
Real GDP growth, %	8	8	6	0	3	3	2	0	6	0	1	2	2	2	3
Debt growth, %		24	22	22	24	20	16	17	18	20	20	3	20	13	16

SOURCE: International Monetary Fund; Bank of Spain; Haver Analytics; McKinsey Global Institute

Exhibit B.16

Spain's inflation rate peaked in 1977 at 25 percent



SOURCE: International Monetary Fund; Bank of Argentina; Haver Analytics; McKinsey Global Institute

The Spanish episode illustrates how inflation can enable deleveraging, but also the real cost to the economy and investment. Several other mature economies also experienced deleveraging in the wake of the oil shocks of the 1970s. In Italy, for example, the inflation rate jumped from the low single digits in the early 1970s to an average of 17 percent from 1974 to 1977. Its ratio of debt to GDP declined from 240 percent in 1975 to 181 percent in 1981. Like Spain, deleveraging occurred in Italy's private sector.

C. EPISODES OF DELEVERAGING THAT DID NOT FOLLOW A FINANCIAL CRISIS

We have until this point focused on deleveraging episodes that followed financial crises, due to their greater relevance for today. While such episodes represent more than two-thirds of our sample, we find 13 other episodes of deleveraging that occurred without any crisis. These episodes are interesting in their own right as, in many cases, deleveraging was undertaken voluntarily and the economic impact of deleveraging can be assessed more clearly without the additional stresses caused by financial crises. Following our earlier methodology, we segment the sample into the same archetypes and find that seven of these 13 episodes fit our "belt-tightening" archetype, four the "high inflation" archetypes, and two the "growing of out debt" archetype. There were no episodes of "massive default" without a financial crisis. We examine each archetype in turn.

Belt-tightening

In most of these cases, reductions in government debt relative to GDP drove the deleveraging. In many cases this reduction in government debt was driven by a policy choice by the central government to reduce its outstanding debt burden. For instance, prior to joining the euro monetary union, Belgium reduced its government debt substantially, from 73 percent of GDP in 1997 to 31 percent in 2004. The Belgium government managed this deleveraging through a dramatic reduction in fiscal deficits, achieving a balanced budget in 2000 compared with a deficit of over 8 percent of GDP just eight years earlier. Ireland had a similar experience from 1988 to 1994, reducing its government debt by a third through a dramatic improvement in fiscal balances. The Irish budget deficit fell from more than 10 percent of GDP in 1985 to 2 percent of GDP in 1994.

Canada 1998–2005—Belt-tightening through fiscal spending cuts

With many countries today projected to greatly increase their government debt, it is instructive to analyze one episode of sovereign deleveraging in more detail. Between 1998 and 2005, Canada deleveraged significantly, driven by the public sector, with total debt to GDP dropping from 240 percent to 212 percent (Exhibit B.17). Real economic growth remained strong during this period, averaging 3.4 percent annually compared with 3 percent before the start of deleveraging. With strong economic growth and a gradual reduction in credit, Canada's deleveraging case appears to be one of the most successful in our sample.

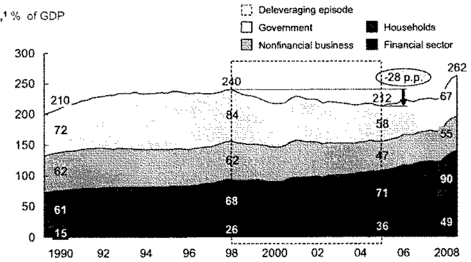
In 1998, Canada's debt stood at 240 percent of GDP, up from 196 percent a decade earlier. Government debt stood at 84 percent of GDP, of which federal debt accounted for slightly greater than half. Canadian public debt had remained consistently high since the 1980s but started to climb rapidly in the 1990s to finance rising pension and health care costs. Government debt rose from 72 percent of GDP in 1990 to a peak of 94 percent in the first quarter of 1996.

Federal government debt accounted for most of the deleveraging, dropping by 20 percentage points over the period, while state and provincial debt also fell by 6 percentage points. Much of the drop in federal debt was attributable to the budget deficit reduction policies of Paul Martin, first as finance minister and later as prime minister. These included measures that cut business and farm subsidies, commercialized public spending programs, imposed user charges, and scaled back most government spending programs (including health care, education, welfare, and defense)–eliminating some 55,000 government jobs. Together, these actions

Exhibit B.17

Canada's overall economy deleveraged from 1998 to 2005

Debt by sector,[1] % of GDP



Real GDP and debt growth

Real GDP growth, %	0	-2	1	2	5	3	2	4	4	6	5	2	3	2	3	3	3	3	1
Debt growth, %	-1	7	6	6	6	6	3	6	7	2	4	9	2	3	5	5	10	7	14

1 Some figures do not sum due to rounding.
SOURCE: International Monetary Fund; Haver Analytics; McKinsey Global Institute

reduced government spending by 10 percentage points of GDP. In 1993, Canada's budget deficit was equal to 8 percent of GDP; by 1997, the federal budget was balanced and the government had begun to reduce the nominal amount of federal debt outstanding.

In the aftermath of the 2001 dot-com collapse, nonfinancial businesses debt fell, dropping from 62 percent of GDP in 1998 to 47 percent in 2005. While low interest rates and continued economic growth provided little incentive for corporations to deleverage, prior overinvestment in the telecoms and IT sectors ended, resulting in deleveraging of the nonfinancial corporate sector. In contrast, household and financial sector debt combined grew from 94 percent of GDP to 107 percent during the period. Household debt, in particular, grew faster after 2003 as Canadian house prices began to rise.

Canada's deleveraging episode provides a model for countries with highly indebted governments today. The key requirement was the political will to force through unpopular government spending cuts. With mature market governments today projected to accumulate the largest debt burdens since World War II, Canada's experience in sovereign debt reduction is instructive.

High inflation

Four countries have experienced significant deleveraging as a result of high inflation: Italy from 1975 to 1981, Nigeria from 1986 to 1991, Paraguay from 1983 to 1987, and Portugal from 1983 to 1990. In each case, nominal GDP growth surged as inflation rose, exceeding 20 percent annually in every case and more than 50 percent in some. The scale of deleveraging was largest in Nigeria, where debt relative to GDP fell to less than half its level before the episode. The high inflation and deleveraging did not come without a cost—in all cases, the rate of real economic growth was less than before deleveraging.

Growing out of debt

We find two episodes of the "growing out of debt" archetype—Egypt from 1975 to 1979, and Nigeria from 1968 to 1971. Egypt experienced a rapid acceleration of GDP growth because of a "peace dividend" after the Yom Kippur War; real GDP rose by an average 13 percent annually over 1976–79. Rapid GDP growth, combined with a decline in government spending, helped drive government debt down from 28 percent of GDP to 20 percent. The decline in government debt reduced total debt from 46 percent of GDP to 40 percent over the period.

In 1968, Nigeria began a short period of deleveraging, with total debt falling by half from 15 percent of GDP to 8 percent by 1971. As in Egypt, rapid real GDP growth was the primary driver of this deleveraging, with an average annual growth rate of 56 percent over the three-year period. This growth came as the economy rebounded strongly after a severe recession in 1967 and 1968.

Table 2.5 lists deleveraging episodes that did not follow a financial crisis.

Table 2.5 - Historic deleveraging episodes that did not follow a financial crisis

	Deleveraging period			Total debt/GDP			
Country	**Start**	**End**	**Financial crisis**	**Start, %**	**End, %**	**Relative change, %**	**Absolute change, percentage points of GDP**
"Growing out of debt"							
Egypt	1975	1979	no	46	40	-14	-6
Nigeria	1968	1971	no	15	8	-48	-7
"High inflation"							
Italy	1975	1981	no	240	181	-25	-59
Nigeria	1986	1991	no	43	18	-58	-25
Paraguay	1983	1987	no	19	13	-31	-6
Portugal	1983	1990	no	106	70	-34	-36
"Belt-tightening"							
Belgium	1997	2004	no	150	98	-34	-52
Canada	1998	2005	no	242	217	-10	-25
Chile	2002	2006	no	135	102	-25	-33
Egypt	2002	2007	no	91	78	-14	-13
Ireland	1988	1994	no	183	145	-21	-38
Nigeria	2001	2005	no	49	30	-38	-19
Switzerland	1969	1974	no	135	101	-25	-34

Source: International Monetary Fund; C. Reinhart and K. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*; McKinsey Global Institute

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Growth in a Time of Debt*

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Growth in a Time of Debt

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ABSTRACT

We study economic growth and inflation at different levels of government and external debt. Our analysis is based on new data on forty-four countries spanning about two hundred years. The dataset incorporates over 3,700 annual observations covering a wide range of political systems, institutions, exchange rate arrangements, and historic circumstances. Our main findings are: ***First,*** the relationship between government debt and real GDP growth is weak for debt/GDP ratios below a threshold of 90 percent of GDP. Above 90 percent, median growth rates fall by one percent, and average growth falls considerably more. We find that the threshold for **public** debt is similar in advanced and emerging economies. ***Second,*** emerging markets face lower thresholds for external debt (public and private)—which is usually denominated in a foreign currency. When external debt reaches 60 percent of GDP, annual growth declines by about two percent; for higher levels, growth rates are roughly cut in half. ***Third,*** there is no apparent contemporaneous link between inflation and public debt levels for the advanced countries as a group (some countries, such as the United States, have experienced higher inflation when debt/GDP is high.) The story is entirely different for emerging markets, where inflation rises sharply as debt increases.

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I. Introduction

In this paper, we exploit a new multi-country historical data set on central government debt as well as more recent data on external (public and private) debt to search for a systematic relationship between debt levels, growth and inflation.[1] Our main result is that whereas the link between growth and debt seems relatively weak at "normal" debt levels, median growth rates for countries with public debt over 90 percent of GDP are roughly one percent lower than otherwise; average (mean) growth rates are several percent lower. Surprisingly, the relationship between public debt and growth is remarkably similar across emerging markets and advanced economies. Emerging markets do face a much more binding threshold for total gross external debt (public and private)—which is almost exclusively denominated in a foreign currency. We find no systematic relationship between high debt levels and inflation for advanced economies as a group (albeit with individual country exceptions including the United States). By contrast, inflation rates are markedly higher in emerging market countries with higher public debt levels.

Our topic would seem to be a timely one. Government debt has been soaring in the wake of the recent global financial maelstrom, especially in the epi-center countries. This might have been expected. Using a benchmark of 14 earlier severe post-World-War II financial crises, we demonstrated (one year ago) that central government debt rises, on average, by about 86 percent within three years after the crisis.[2]

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[1] In this paper "public debt" refers to gross central government debt. "Domestic public debt" is government debt issued under domestic legal jurisdiction. Public debt does not include debts carrying a government guarantee. Total gross external debt includes the external debts of **all** branches of government as well as private debt that is issued by domestic private entities under a foreign jurisdiction.

[2] Reinhart and Rogoff (2009a, b) demonstrate that the aftermath of a deep financial crisis typically involves a protracted period of macroeconomic adjustment, particularly in employment and housing prices.

Outsized deficits and epic bank bailouts may be useful in fighting a downturn, but what is the long run macroeconomic impact or higher levels of government debt, especially against the backdrop of graying populations and rising social insurance costs?

Our approach here is decidedly empirical, taking advantage of a broad new historical data set on public debt (in particular, central government debt), first presented in Reinhart and Rogoff (2008, 2009b). Prior to this data set, it was exceedingly difficult to get more than two or three decades of public debt data even for many rich countries, and virtually impossible for most emerging markets.[3] Our results incorporate data on forty-four countries spanning about two hundred years. Taken together, the data incorporate over 3,700 annual observations covering a wide range of political systems, institutions, exchange rate and monetary arrangements, and historic circumstances.

We also employ more recent data on external debt, including both debt owed by governments and by private entities. For emerging markets, we find that there exists a significantly more severe threshold for total gross external debt (public and private) -- which tends to be almost exclusively denominated in a foreign currency -- than for total public debt.(the domestically-issued component of which is largely denominated in home currency.) When gross external debt reaches 60 percent of GDP, annual growth declines by about two percent; for levels of external debt in excess of 90 percent of GDP, growth rates are roughly cut in half. We are not in a position to calculate separate total external debt thresholds (as opposed to public debt thresholds) for advanced countries. The available time series is too recent, beginning only in early 2000s as a byproduct of the International Monetary Fund efforts and creation of the Special

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[3] For other related efforts on developing cross country public debt data bases, including Reinhart, Rogoff and Savasatano (2003) and Jeanne and Guscina (2006), see the discussion in Reinhart and Rogoff (2009b).

Data Dissemination Standard (SDDS). We do note, however, that external debt levels in advanced countries now average about 200 percent of GDP, with external debt levels being particularly high across Europe.

The focus of this paper is on the longer term macroeconomic implications of much higher public and external debt. The final section, however, discusses the role of private domestic debt examining the historical experience of the United States. We highlight episodes of private sector deleveraging of debts, normal after a systemic financial crisis; not surprisingly, such episodes are associated with very slow growth and deflation.

II. The Global 2007-2009 Buildup in Public Debt

Figure 1 illustrates the increase in (inflation adjusted) public debt that has occurred since 2007. For the five countries with systemic financial crises (Iceland, Ireland, Spain, the United Kingdom, and the United States), average debt levels are up by about 75 percent, well on track to reach or surpass the three year 86 percent benchmark that Reinhart and Rogoff (2009a,b) find for earlier deep post-war financial crises. Even in countries that have not experienced a major financial crisis, debt rose an average of about 20 percent in real terms between 2007 and 2009.[4] This general rise in public indebtedness stands in stark contrast to the 2003-2006 period of public deleveraging in many countries and owes to direct bail-out costs in some countries, the adoption of stimulus packages to deal with the global recession in many countries, and marked declines in government revenues that have hit advanced and emerging market economies alike.

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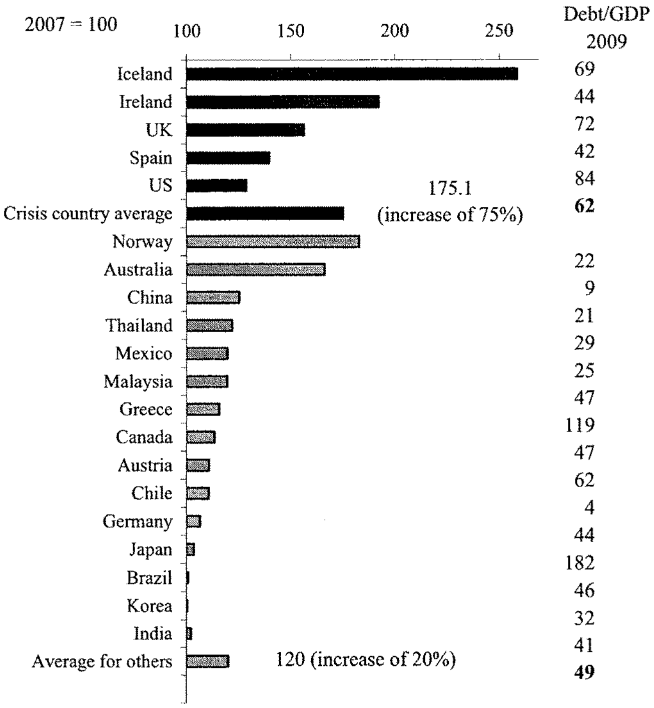
[4] Our focus on gross central government debt owes to the fact that time series of broader measures government are not available for many countries. Of course, the true run-up in debt is significantly larger than stated here, at least on a present value actuarial basis, due to the extensive government guarantees that have been conferred on the financial sector in the crisis countries and elsewhere.

Figure 1. Cumulative Increase in Real Public Debt Since 2007, Selected Countries



Notes: Unless otherwise noted these figures are for central government debt deflated by consumer prices.
Sources: Prices and nominal GDP from International Monetary Fund, *World Economic Outlook*. For a complete listing of sources for government debt, see Reinhart and Rogoff (2009b).

III. Debt, Growth, and Inflation

The simplest connection between public debt and growth is suggested by Robert Barro (1979). Assuming taxes ultimately need to be raised to achieve debt sustainability, the distortionary impact imply is likely to lower potential output. Of course, governments can also tighten by reducing spending, which can also be contractionary. As for inflation, an obvious connection stems from the fact that unanticipated high inflation can reduce the real cost of servicing the debt. Of course, the efficacy of the inflation channel is quite sensitive to the maturity structure of the debt. Whereas long-term nominal government debt is extremely vulnerable to inflation, short term debt is far less so. Any government that attempts to inflate away the real value of short term debt will soon find itself paying much higher interest rates.

In principle, the manner in which debt builds up can be important. For example, war debts are arguably less problematic for future growth and inflation than large debts that are accumulated in peace time. Postwar growth tends to be high as war-time allocation of manpower and resources funnels to the civilian economy. Moreover, high war-time government spending, typically the cause of the debt buildup, comes to a natural close as peace returns. In contrast, a peacetime debt explosion often reflects unstable underlying political economy dynamics that can persist for very long periods.

Here we will not attempt to discriminate the genesis of debt buildups, and instead simply look at their connection to average and median growth and inflation outcomes. This may lead us, if anything, to understate the adverse growth implications of debt burdens arising out of the current crisis, which was clearly a peace time event.

A. Evidence from Advanced Countries

Figure 2 presents a summary of inflation and GDP growth across varying levels of debt for twenty advanced countries over the period 1946-2009. This group includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The annual observations are grouped into four categories, according to the ratio of debt-to GDP during that particular year as follows: years when debt to GDP levels were below 30 percent (low debt); years where debt/GDP was 30 to 60 percent (medium debt); 60 to 90 percent (high); and above 90 percent (very high). [5] The bars in Figure 2 show average and median GDP growth for each of the four debt categories. Note that of the 1186 annual observations, there are a significant number in each category, including 96 above 90 percent. (Recent observations in that top bracket come from Belgium, Greece, Italy, and Japan.) From the figure, it is evident that there is no obvious link between debt and growth until public debt reaches a threshold of 90 percent. The observations with debt to GDP over 90 percent have median growth roughly 1 percent lower than the lower debt burden groups and mean levels of growth almost 4 percent lower. (Using lagged debt should not dramatically change the picture.) The line in Figure 2 plots the median inflation for the different debt groupings—which makes plain that there is no apparent pattern of **simultaneous** rising inflation and debt. [6]

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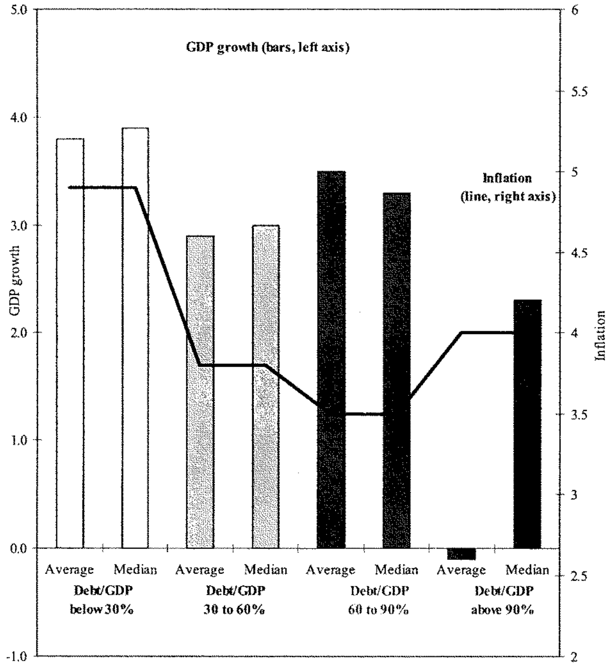
[5] The four "buckets" encompassing low, medium-low, medium-high, and high debt levels are based on our interpretation of much of the literature and policy discussion on what is considered low, high etc debt levels. It parallels the World Bank country groupings according to four income groups. Sensitivity analysis involving a different set of debt cutoffs merits exploration as do country-specific debt thresholds along the broad lines discussed in Reinhart, Rogoff, and Savastano (2003).

[6] See Appendix Tables 1 and 2 for 1946-2009 summary statistics on growth and inflation, respectively, for advanced economies and emerging markets.

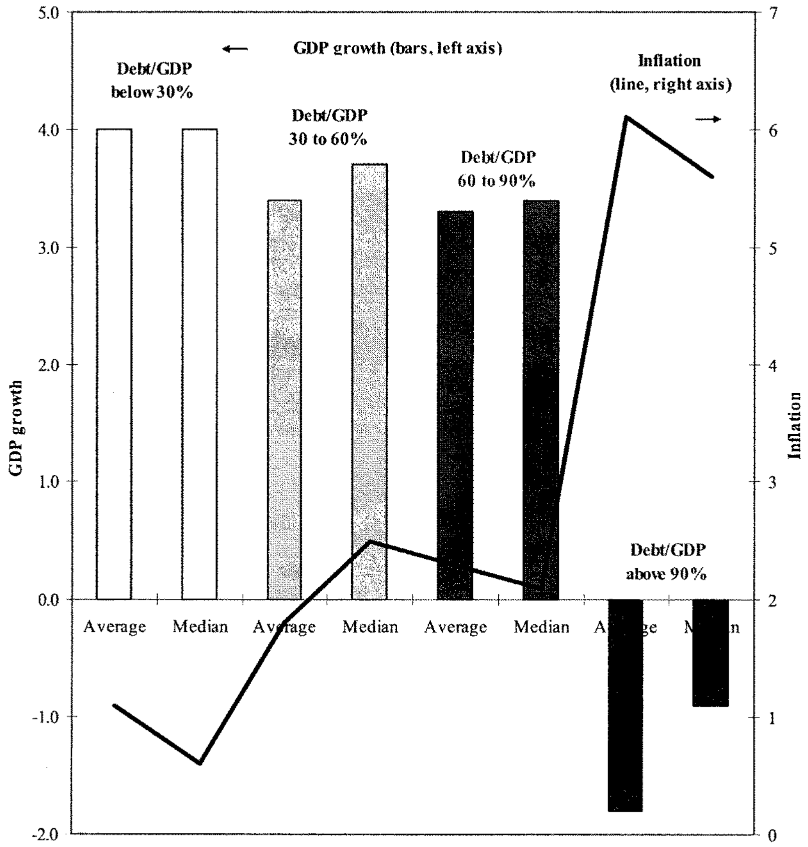
Figure 2. Government Debt, Growth, and Inflation: Selected Advanced Economies, 1946-2009



Notes: Central government debt includes domestic and external public debts. The 20 advanced economies included are Australia. Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The number of observations for the four debt groups are: 443 for debt/GDP below 30%; 442 for debt/GDP 30 to 60%; 199 observations for debt/GDP 60 to 90%; and 96 for debt/GDP above 90%. There are 1,180 observations.
Sources: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance*, and Reinhart and Rogoff (2009b) and sources cited therein.

There are exceptions to this inflation result, as Figure 3 makes plain for the Unites States, where debt levels over 90% of GDP are linked to significantly elevated inflation. Figure 3 spans 1791-2009, but the pattern for the post-war period taken alone is very similar.

Figure 3. United States Central (Federal) Government Debt, Growth, and Inflation: 1790-2009



Notes: Central government debt is gross debt. The number of observations for the four debt groups are: 129 for debt/GDP below 30%; 59 for debt/GDP 30 to 60%; 23 observations for debt/GDP 60 to 90%; and 5 for debt/GDP above 90%, for a total of 216 observations.

Sources: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance,*), US Treasury Direct, Reinhart and Rogoff (2009) and sources cited therein.

Table 1 provides detail on the growth experience for individual countries, but over a much longer period, typically one to two centuries. Interestingly, introducing the longer time series yields remarkably similar conclusions. Over the past two centuries, debt in excess of 90 percent has typically been associated with mean growth of 1.7 percent versus 3.7 percent when debt is low (under 30 percent of GDP), and compared with growth rates of over 3 percent for the two middle categories (debt between 30 and 90 percent of GDP). Of course, there is considerable variation across the countries, with some countries such as Australia and New Zealand experiencing no growth deterioration at very high debt levels. It is noteworthy, however, that those high-growth high-debt observations are clustered in the years following World War II.

Table 1. Real GDP Growth as the Level of Government Debt Varies:
Selected Advanced Economies, 1790-2009
(annual percent change)

		Central (Federal) government debt/ GDP			
Country	Period	Below 30 percent	30 to 60 percent	60 to 90 percent	90 percent and above
Australia	1902-2009	3.1	4.1	2.3	4.6
Austria	1880-2009	4.3	3.0	2.3	n.a.
Belgium	1835-2009	3.0	2.6	2.1	3.3
Canada	1925-2009	2.0	4.5	3.0	2.2
Denmark	1880-2009	3.1	1.7	2.4	n.a.
Finland	1913-2009	3.2	3.0	4.3	1.9
France	1880-2009	4.9	2.7	2.8	2.3
Germany	1880-2009	3.6	0.9	n.a.	n.a.
Greece	1884-2009	4.0	***0.3***	***4.8***	2.5
Ireland	1949-2009	4.4	4.5	4.0	2.4
Italy	1880-2009	***5.4***	***4.9***	1.9	0.7
Japan	1885-2009	4.9	3.7	3.9	0.7
Netherlands	1880-2009	4.0	2.8	2.4	2.0
New Zealand	1932-2009	2.5	2.9	3.9	**3.6**
Norway	1880-2009	2.9	4.4	n.a.	n.a.
Portugal	1851-2009	4.8	2.5	1.4	n.a.
Spain	1850-2009	***1.6***	3.3	***1.3***	2.2
Sweden	1880-2009	2.9	2.9	2.7	n.a.
United Kingdom	1830-2009	2.5	2.2	2.1	1.8
United States	1790-2009	4.0	3.4	3.3	***-1.8***
Average		**3.7**	**3.0**	**3.4**	**1.7**
Median		**3.9**	**3.1**	**2.8**	**1.9**
Number of observations = **2,317**		866	654	445	352

Notes: An n.a. denotes no observations were recorded for that particular debt range. There are missing observations, most notably during World War I and II years; further details are provided in the data appendices to Reinhart and Rogoff (2009) and are available from the authors. Minimum and maximum values for each debt range are shown in ***bolded italics.***
Sources: There are many sources, among the more prominent are: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance.* Extensive other sources are cited Reinhart and Rogoff (2009).

B. Evidence from Emerging Market Countries

We next perform the same debt ratio exercise for 24 emerging market economies for the periods 1946-2009 and 1900-2009, using comparable central government debt data as we used for the advanced economies. [7] Perhaps surprisingly, the results illustrated in Figure 4 and Table 2 for emerging markets largely repeat the results in Figure 2 and Table 1. For 1900-2009, for example, median and average GDP growth hovers around 4-4.5 percent for levels of debt below 90 percent of GDP but median growth falls markedly to 2.9 percent for high debt (above 90 percent); the decline is even greater for the average growth rate, which falls to 1 percent. With much faster population growth than the advanced economies, the implications for per capita GDP growth are in line (or worse) with those shown for advanced economies. The similarities with advanced economies end there, as higher debt levels are associated with significantly higher levels of inflation in emerging markets. Median inflation more than doubles (from less than 7 percent to 16 percent) as debt rises from the low (0 to 30 percent) range to above 90 percent. [8] Fiscal dominance is a plausible interpretation of this pattern.

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[7] While we have pre-1900 inflation, real GDP, and public debt data for many emerging markets, nominal GDP data is seldom available.

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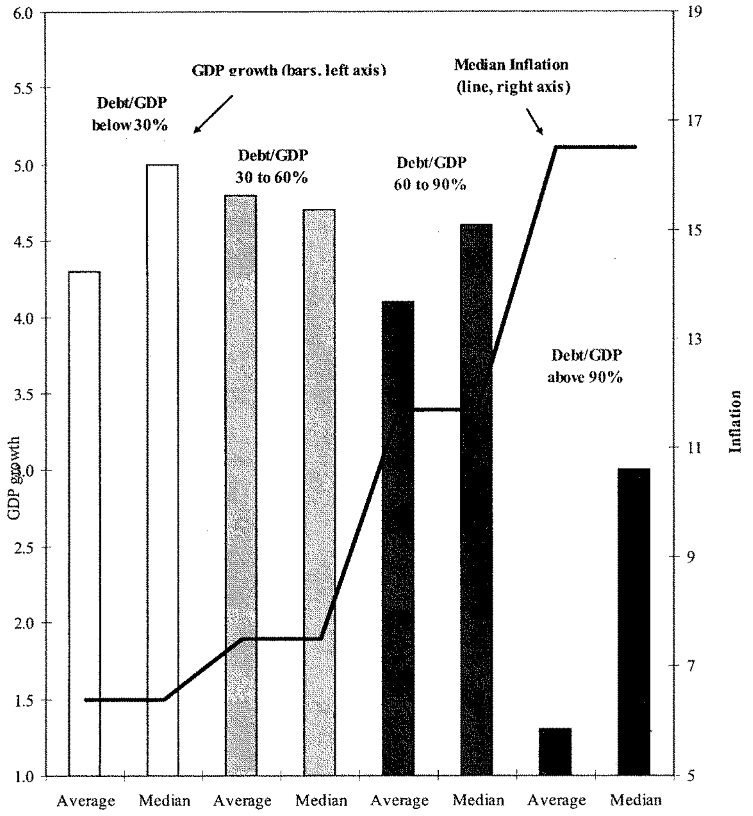
[8] See Appendix Tables 1 and 2 for 1946-2009 summary statistics on growth and inflation, respectively, for advanced economies and emerging markets.

Figure 4. Public Debt, Growth, and Inflation: Selected Emerging Markets, 1946-2009



Notes: The 24 emerging market countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Ghana, India, Indonesia, Kenya, Korea, Malaysia, Mexico, Nigeria, Peru, Philippines, Singapore, South Africa, Sri Lanka, Thailand, Turkey, Uruguay, and Venezuela. The number of observations for the four debt groups are: 502 for debt/GDP below 30%; 385 for debt/GDP 30 to 60%; 145 observations for debt/GDP 60 to 90%; and 110 for debt/GDP above 90%. There are a total of 1142 annual observations.

Sources: International Monetary Fund, *World Economic Outlook*, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

Table 2. Real GDP Growth as the Level of Government Debt Varies:
Selected Emerging Market Economies, 1900-2009
(annual percent change)

		Central (Federal) government debt/ GDP			
Country	Period	Below 30 percent	30 to 60 percent	60 to 90 percent	90 percent and above
Argentina	1900-2009	4.3	2.7	3.6	0.5
Bolivia	1950-2009	***0.7***	5.2	3.7	3.9
Brazil	1980-2009	3.2	2.3	2.6	2.3
Chile	1900-2009	4.0	***1.0***	7.5	-4.5
Colombia	1923-2009	4.3	3.0	n.a.	n.a.
Costa Rica	1950-2009	***6.9***	5.0	3.4	3.0
Ecuador	1939-2009	5.3	5.0	3.2.	1.5
El Salvador	1939-2009	3.6	2.6	n.a.	n.a.
Ghana	1952-2009	n.a.	4.6	4.7	1.9
India	1950-2009	4.2.	4.9	n.a.	n.a.
Indonesia	1972-2009	6.6	6.3	***-0.1***	3.1
Kenya	1963-2009	6.3	4.2	2.3	1.2
Malaysia	1955-2009	2.0	6.2	6.9	***5.5***
Mexico	1917-2009	4.1	3.4	1.2.	-0.7
Nigeria	1990-2009	5.4	***10.6***	***11.2***	2.6.
Peru	1917-2009	4.3	2.9	2.7	n.a.
Philippines	1950-2009	5.0	3.8	5.1	n.a.
Singapore	1969-2009	n.a.	9.5	8.2	4.0.
South Africa	1950-2009	2.0	3.5	n.a.	n.a.
Sri Lanka	1950-2009	3.3	3.7	4.2	5.0
Thailand	1950-2009	6.1	6.6	n.a..	n.a.
Turkey	1933-2009	5.4	3.7	3.2	-6.4
Uruguay	1935-2009	2.1	3.1	3.2	0.0
Venezuela	1921-2009	6.5	4.1	3.2	***-6.5***
Average		**4.3**	**4.1**	**4.2**	**1.0**
Median		**4.5**	**4.4**	**4.5**	**2.9**
Number of observations = **1,397**		686	450	148	113

Notes: An n.a. denotes no observations were recorded for that particular debt range. There are missing observations for some years details are provided in the data appendices to Reinhart and Rogoff (2009) and are available from the authors. Minimum and maximum values for each debt range are shown in ***bolded italics.***

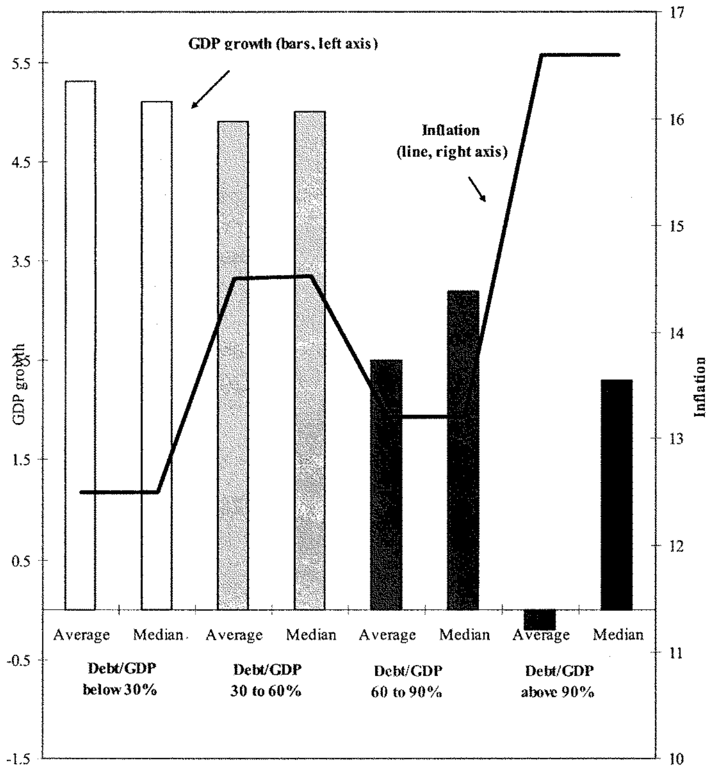
Sources: There are many sources, among the more prominent are: International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance.* Extensive other sources are cited Reinhart and Rogoff (2009).

C. External Debts

Because emerging markets often depend so much on external borrowing, it is interesting to look separately at thresholds for external debt (combined public and private). Combined public and private sector debt is of interest because in the case of crisis, the distinction between public and private often becomes blurred in a maze of bailouts, guarantees, and international hard currency constraints (see Reinhart and Rogoff, 2009b).

In Figure 5, we highlight the connection between for gross external debt as reported by the World Bank and growth and inflation. As one can see, the growth thresholds for external debt are considerably lower than for the thresholds for total public debt. Growth deteriorates markedly at external debt levels over 60 percent, and further still when external debt levels exceed 90 percent, which record outright declines. In light of this, it is more understandable that over one half of all defaults on external debt in emerging markets since 1970 occurred at levels of debt that would have met the Maastricht criteria of 60 percent or less. Inflation becomes significantly higher only for the group of observations with external debt over 90 percent.

Figure 5. External Debt, Growth, and Inflation: Selected Emerging Markets, 1970-2009

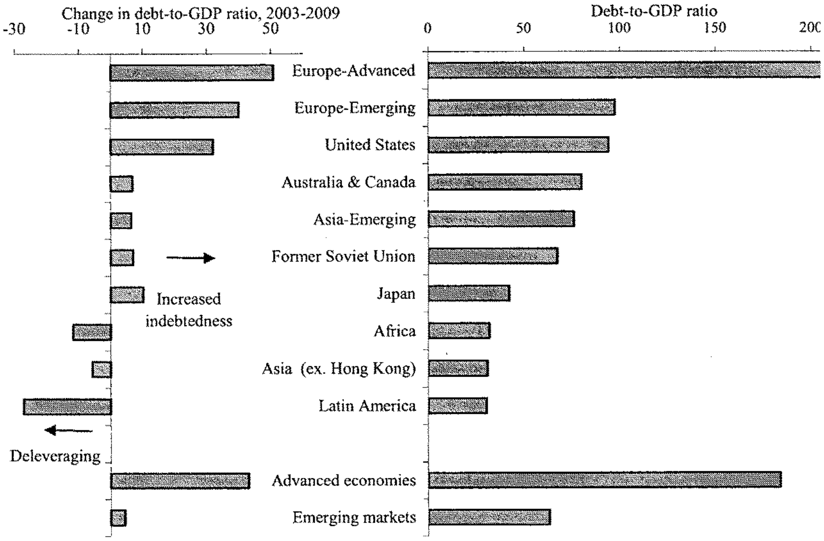


Notes: External debt includes public and private debts. The 20 emerging market countries included are Argentina, Bolivia, Brazil, Chile, China, Colombia, Egypt, India, Indonesia, Korea, Malaysia, Mexico, Nigeria, Peru, Philippines, South Africa, Thailand, Turkey, Uruguay, and Venezuela. The number of observations for the four debt groups are: 252 for debt/GDP below 30%; 309 for debt/GDP 30 to 60%; 120 observations for debt/GDP 60 to 90%; and 74 for debt/GDP above 90%. There is a total of 755 annual observations.

Sources: International Monetary Fund, *World Economic Outlook*, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

As noted in the introduction, there is no comparable long time series on total external debt for advanced countries; the relatively new IMF data set we use begins only in 2003. Although we have no historical benchmarks for the advanced countries, the summary results in Figure 6, based on 2003-2009 gross external debt as a percent of GDP, is indeed disconcerting. The left hand panel of the figure indicates whether there has been an increase in indebtedness to GDP over the 2003-09 period, or a decrease (deleveraging.). The right hand panel gives the ratio of gross external debt to GDP as of the end of the second quarter of 2009. The group averages are based on a total data set of 59 countries.

Figure 6. Gross External Debt as a Percent of GDP: Averages for Selected 59 Countries, 2003-2009
(in percent)



Sources: International Monetary Fund, *World Economic Outlook*, World, Bank, Quarterly External Debt Statistics (QUEDS), and authors' calculations.
Notes: Data for 2009 end in the second quarter. The countries participating in QUEDS included in these calculations are listed in what follows by region. *Advanced-Europe:* Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, (15 countries). If Ireland were included, the averages would be substantially higher for this group. *Emerging Europe*: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, Romania, Slovak Republic, Slovenia, and Turkey, (11 countries). *Former Soviet Union:* Armenia, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, and the Ukraine (8 countries). *Africa*: Egypt, South Africa, and Tunisia (3 countries). *Asia-Emerging*: Hong Kong, India, Indonesia, Korea, Malaysia, Thailand (6 countries*). Latin America*: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Paraguay, Peru, and Uruguay (12 countries). There are a total of 19 advanced economies and 40 emerging markets.

As the right hand side of the figure illustrates, external debt burdens are particularly high in Europe, with an average external debt to GDP ratio across advanced European economies of over 200 percent, and an average external debt to GDP across emerging European economies roughly 100 percent.[9] (The fact that a sizable share of these debts are intra-European may or may prove a significant mitigating factor.) Interestingly, the United States' gross debt liabilities are less than half of Europe's as a share of GDP, despite the country's epic sequence of trade balance deficits. Japan, despite having a gross public debt to GDP ratio approaching 200 percent, has much smaller gross external liabilities still, thanks in no small part to Japan's famously strong home bias in bond holdings.

Famously profligate Latin America, by contrast to the advanced economies, now has gross external debt liabilities averaging only around 50 percent of GDP. Moreoever, in contrast to the advanced countries who added an average of 50 percent of GDP to gross external debt during the recent period, Latin American countries actually delivered external debt by over 30 percent of GDP.

Of course, given the lack of sufficient long-dated historical data on advanced economies external debts, it is not possible to know whether they face similar thresholds to emerging markets. It is likely that the thresholds are higher for advanced economies that issue most external debt in their own currency.

IV. Private Sector Debt: An Illustration

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[9] In effect, if Ireland is added to the list, the average for advanced European economies rises to 266 percent!.

Our main focus has been on total public and total external debt, since reliable data on private internal domestic debts are much scarcer across countries and time. We have shown that public levels of debt/GDP that push the 90 percent threshold are associated with lower median and average growth; for emerging markets there are even stricter thresholds for external debt while growth thresholds for advanced economies remains an open question due to the fact only very recent data is available.[10]

These observations, however, present only a partial picture of the post-financial crisis landscape, particularly for the years immediately following the crisis. Private debt, in contrast to public debt, tends to shrink sharply for an extended period after a financial crisis. Just as a rapid expansion in private credit fuels the boom phase of the cycle, so does serious deleveraging exacerbate the post-crisis downturn. Just as a rapid expansion in private credit fuels the boom phase of the cycle, so does serious deleveraging exacerbate the post-crisis downturn. This pattern is illustrated in Figure 7, which shows the ratio of private debt to GDP for the United States for 1916-2009. Periods of sharp deleveraging have followed periods of lower growth and coincide with higher unemployment (as shown in the inset to the figure). In varying degrees, the private sector (households and firms) in many other countries (notably both advanced and emerging Europe) are also unwinding the debt built up during the boom years. Thus, private deleveraging may be another legacy of the financial crisis that may dampen growth in the medium term.

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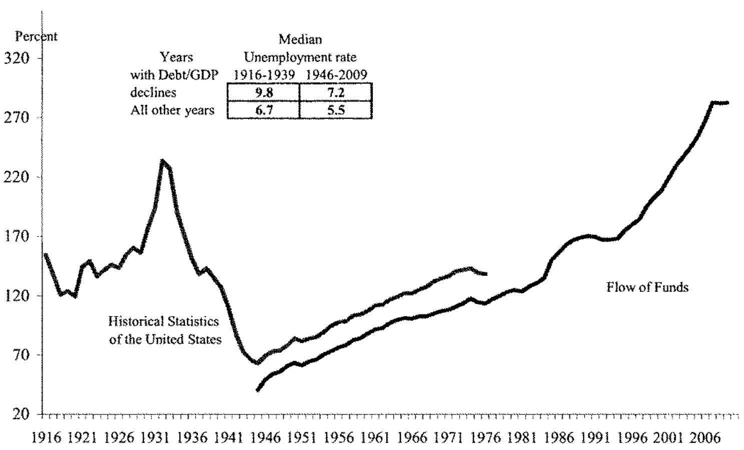
[10] It is important to note that post crises increases in public debt do not necessarily push economies in to the vulnerable 90+ debt/GDP range.

Figure 7. United States: Private Debt Outstanding, 1916-2009
(end-of- period stock of debt as a percent of GDP)



Years with Debt/GDP	Median Unemployment rate 1916-1939	Median Unemployment rate 1946-2009
declines	9.8	7.2
All other years	6.7	5.5

Notes: Data for 2009 is end-of-June.

Sources: Historical Statistics of the United States, Flow of Funds, Board of Governors of the Federal Reserve International Monetary Fund, *World Economic Outlook*, OECD, World Bank, *Global Development Finance,* and Reinhart and Rogoff (2009b) and sources cited therein.

V. Concluding Remarks

The sharp run-up in public sector debt will likely prove one of the most enduring legacies of the 2007-2009 financial crises in the United States and elsewhere. We examine the experience of forty four countries spanning up to two centuries of data on central government debt, inflation and growth. Our main finding is that across both advanced countries and emerging markets, high debt/GDP levels (90 percent and above) are associated with notably lower growth outcomes. In addition, for emerging markets, there appears to be a more stringent threshold for total external debt/GDP (60 percent), that is also associated with adverse outcomes for growth. Seldom do countries simply "grow" their way out of deep debt burdens.

Why are there thresholds in debt, and why 90 percent? This is an important question that merits further research, but we would speculate that the phenomenon is closely linked to logic underlying our earlier analysis of "debt intolerance" in Reinhart, Rogoff, and Savastano (2003). As we argued in that paper, debt thresholds are importantly country-specific and as such the four broad debt groupings presented here merit further sensitivity analysis. A general result of our "debt intolerance" analysis, however, highlights that as debt levels rise towards historical limits, risk premia begin to rise sharply, facing highly indebted governments with difficult tradeoffs. Even countries that are committed to fully repaying their debts are forced to dramatically tighten fiscal policy in order to appear credible to investors and thereby reduce risk premia. The link between indebtedness and the level and volatility of sovereign risk premia is an obvious topic ripe for revisiting in light of the more comprehensive cross-country data on government debt.

Of course, there are other vulnerabilities associated with debt buildups that depend on the composition of the debt itself. As Reinhart and Rogoff (2009b, ch. 4) emphasize and numerous models suggest, countries that choose to rely excessively on short term borrowing to fund growing debt levels are particularly vulnerable to crises in confidence that can provoke very sudden and "unexpected" financial crises. Similar statements could be made about foreign versus domestic debt, as discussed. At the very minimum, this would suggest that traditional debt management issues should be at the forefront of public policy concerns.

Finally, we note that even aside from high and rising levels of public debt, many advanced countries, particularly in Europe, are presently saddled with extraordinarily high levels of total external debt, debt issued abroad by both the government and private entities. In the case Europe, the advanced country average exceeds 200 percent external debt to GDP. Although we do not have the long-dated time series needed to calculate advanced country external debt thresholds as we do for emerging markets, current high external debt burdens would also seem to be an important vulnerability to monitor.

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Appendix Table 1. Real GDP Growth as the Level of Debt Varies: Summary
(annual percent change)

Measure	Period	Below 30 percent	30 to 60 percent	60 to 90 percent	90 percent and above
Central (Federal) government debt/ GDP- Advanced economies					
Average	1946-2009	4.1	2.8	2.8	-0.1
Median	1946-2009	4.2	3.0	2.9	1.6
Emerging Markets					
Average	1946-2009	4.3	4.8	4.1	1.3
Median	1946-2009	5.0	4.7	4.6	2.9
Total (public plus private) Gross External Debt/GDP					
Average	1970-2009	5.2	4.9	2.5	-0.2
Median	1970-2009	5.1	5.0	3.2	2.4

Appendix Table 2. Inflation as the Level of Debt Varies: Summary
(annual percent change)

Measure	Period	Below 30 percent	30 to 60 percent	60 to 90 percent	90 percent and above
Central (Federal) government debt/ GDP Advanced economies					
Average	1946-2009	6.4	6.3	6.4	5.1
Median	1946-2009	5.2	3.7	3.5	3.9
Emerging Markets					
Average	1946-2009	64.8	39.4	105.9	119.6
Median	1946-2009	6.0	7.5	11.7	16.5
Total (public plus private) Gross External Debt/GDP					
Average	1970-2009	10.3	17.0	37.1	23.4
Median	1970-2009	10.9	12.1	13.2	16.6

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July 1, 2010

The Honorable Judy Biggert
Ranking Member
Subcommittee on Oversight and Investigations
Committee on Financial Services
House of Representatives

Dear Ms. Biggert:

Thank you again for the opportunity to appear before your subcommittee on May 6, 2010, to discuss "The End of Excess (Part One): Reversing Our Addiction to Debt and Leverage." At this hearing, you asked that GAO review the use of leverage by the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), two housing government-sponsored enterprises (GSEs). Based on this and subsequent conversations with your staff, I am attaching my response for inclusion in the hearing record.

To do this, we collected and analyzed various data on GSE leverage and other relevant trends. We interviewed officials at the Federal Housing Finance Agency, the regulator and conservator of Fannie Mae and Freddie Mac, and two economists familiar with these issues. Finally, we reviewed prior GAO work on federal oversight of the GSEs and academic and other studies assessing the buildup of leverage at Fannie Mae and Freddie Mac before the crisis and the adequacy of the regulatory approaches used to restrict their use of leverage.

If you or your staff have any questions about the attached information, please contact me at (202) 512-8678, or williamso@gao.gov.

Sincerely yours,

Orice Williams Brown

Orice Williams Brown
Director, Financial Markets
and Community Investment

Enclosure

cc: Nicole Austin
Jason Goggins
Rosemary Keech
Terre Allison

Enclosure

1. What were the trends in Fannie Mae and Freddie Mac's use of leverage before the recent financial crisis?

Fannie Mae and Freddie Mac (the Enterprises) historically have operated with high levels of leverage. For the Enterprises, balance sheet leverage (measured as a ratio of total assets to equity) consistently has been higher than that of banks and bank holding companies, but remained flat or decreased in the years leading up to the recent crisis. However, this measure of balance sheet leverage understates the Enterprises' leverage because it does not include information about the Enterprises' off-balance sheet assets (the mortgage-backed securities (MBS) for which they provide guarantees) or reflect increases in the riskiness of the Enterprises' on- and off-balance sheet assets before the crisis. Accordingly, our analysis of trends in the Enterprises' leverage considers measures of on- and off-balance sheet assets to equity and areas in which the Enterprises were taking on increased risks relative to the capital they held to absorb losses from those risks.

Basic book value measures of Fannie Mae and Freddie Mac's leverage, including ratios of total on-balance sheet and off-balance sheet assets to equity, indicate that the Enterprises historically have operated at high levels of leverage.[1] Highly leveraged firms can become insolvent with relatively small decreases in asset values. For example, an institution with an assets-to-equity ratio of 20-to-1 (or equivalently, equity equal to 5 percent its total assets) would face complete eradication of its equity if the value of its assets declined by 5 percent.

Since 1993, the ratio of total on-balance sheet assets to equity for both Enterprises generally has exceeded 20-to-1, reaching a high of 44-to-1 for Fannie Mae and 34-to-1 for Freddie Mac (fig.1). In comparison, total assets-to-equity in aggregate for five large U.S. bank holding companies did not exceed 15-to-1 in 1998-2007 and at times has been less than half the balance sheet leverage of Fannie Mae and Freddie Mac.[2] Although the ratios for the Enterprises and other financial institutions are not perfectly comparable, the large differences provide an indication of the relative vulnerability of the Enterprises to declining prices of on-balance sheet assets.[3] Adjusting this measure (total assets to equity) to include the Enterprises' off-balance sheet MBS—for which they guarantee timely payment of interest and principal—gives higher estimates of their leverage. This measure increased steadily for Freddie Mac and slightly for Fannie Mae before the recent crisis and at the end of 2007, was at about 68-to-1 for Fannie Mae and 81-to-1 for Freddie Mac (fig. 1). Similarly adjusting balance sheet leverage measures for other financial

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[1] In our analysis, we used book value, rather than fair value, measures of assets-to-equity. Fair value measures adjust more quickly to changes in the values of assets, but can understate an institution's leverage in strong economic conditions. Conversely, when economic conditions deteriorate, fair value measures of leverage tend to rise relative to book value measures.

[2] Similarly, the asset to equity ratio for the former investment banks was roughly 25-to-1 leading up to the financial crisis.

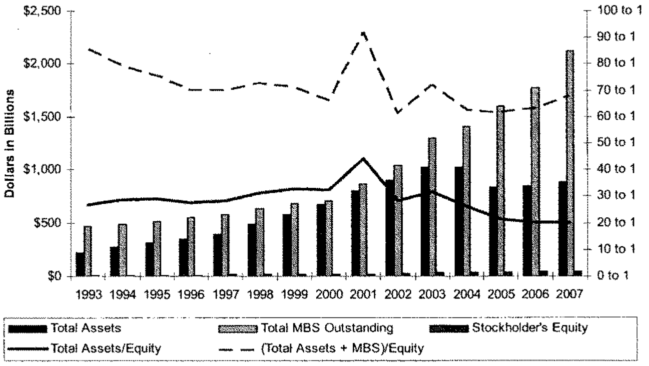
[3] As discussed further below, comparisons of balance sheet leverage for the enterprises and other financial institutions should consider differences in the relative riskiness of institutions' assets. Moreover, balance sheet measures of leverage do not account for risks associated with off-balance sheet assets.

Enclosure

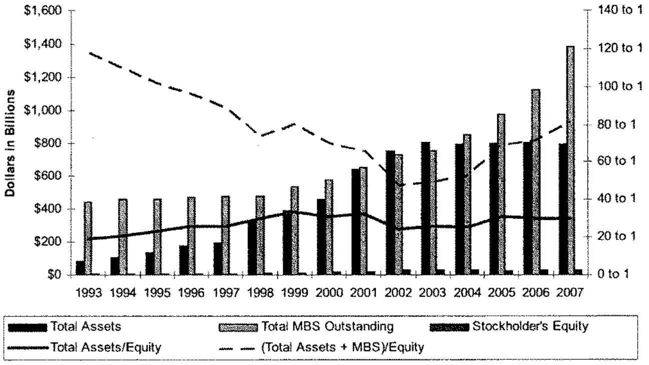
institutions to account for their off-balance sheet obligations would also increase pre-crisis measures of leverage for many of these institutions.

Figure 1: Total Assets, Total Mortgage-Backed Securities Outstanding, Stockholders' Equity and Assets-to-Equity Ratios

Fannie Mae, from 1993 through 2007



Freddie Mac, from 1993 through 2007



Source: FHFA data.
Note: Leverage trend shown for years prior to placement of the Enterprises in conservatorship in 2008.

Enclosure

Including the full value of off-balance sheet obligations in the ratio of assets-to-equity may overstate the Enterprises' leverage to the extent that the guarantees of the outstanding MBS have presented significantly lower risk than the Enterprises' retained mortgage portfolios. However, according to Federal Housing Finance Agency (FHFA) data, in recent years the Enterprises' off-balance sheet obligations have carried greater risks and resulted in greater credit losses than expected.[4] The two economists with whom we spoke said that each Enterprise's "true" leverage could be viewed as falling between a lower bound marked by the balance sheet measure and an upper bound marked by the balance sheet measure adjusted to include the full amount of off-balance sheet obligations.

Although measures of assets-to-equity provide an indication of the level of losses the Enterprises could absorb relative to the size of their on- and off-balance sheet assets, they have significant limitations. Importantly, they do not include information about the riskiness of the Enterprises' assets or about other risks, such as interest rate risk and operational risk, which may contribute to losses. As a result, drawing conclusions about the Enterprises' relative leverage over time solely based on these measures is difficult. For example, a higher assets-to-equity ratio in one year could represent lower leverage for an Enterprise relative to another year in which the Enterprise had a lower ratio, but also held a significantly riskier asset portfolio. Similarly, in comparing the Enterprises' assets-to-equity with that of other financial institutions, it is important to consider differences in the risks the Enterprises and these institutions face. In contrast to other financial institutions that could invest in a broader range of assets, Fannie Mae and Freddie Mac were exposed to significant concentration risk associated with their focus on housing investments.[5] As a result, all other things held constant, a decline in housing prices would translate into larger losses for the Enterprises than for financial institutions with more diversified operations.

Because of the limitations of the leverage measures described above, we have identified areas in which the Enterprises' risk exposures grew in relation to the capital held to absorb losses. Although measures of balance sheet leverage appeared flat or declined in the years leading up to the crisis, the Enterprises faced increasing risks during this time, particularly through holding lower quality mortgage loans and securities in their large retained mortgage portfolios and including riskier mortgage loans in their growing portfolio of outstanding MBS. Before the crisis, some government-sponsored enterprise expressed concerns primarily about the Enterprises' exposure to interest rate risk associated with their large retained portfolios, but credit losses have been the largest source of losses since the crisis began.[6]

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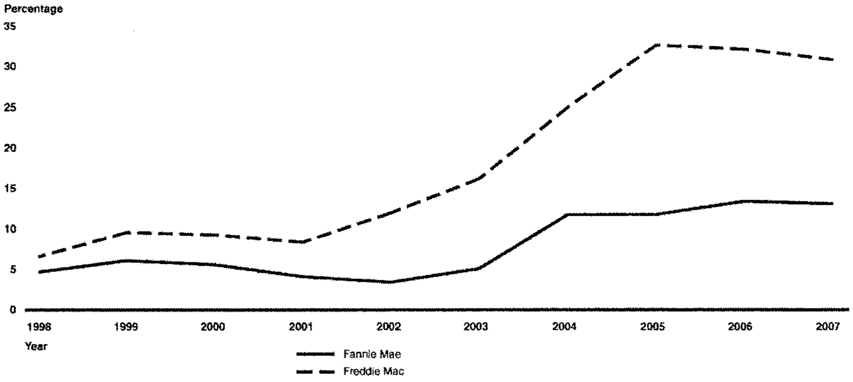
[4] The Housing and Economic Recovery Act of 2008, Pub. L. No. 110-289 (July 30, 2008), established FHFA, which is responsible for the safety and soundness and housing mission oversight of Fannie Mae, Freddie Mac, and the other housing government-sponsored enterprise, the Federal Home Loan Bank System. FHFA was formed by a legislative merger of the Office of Federal Housing Enterprise Oversight (OFHEO), the Federal Housing Finance Board (FHFB) and the U.S. Department of Housing and Urban Development (HUD) government-sponsored enterprise (GSE) mission team.

[5] Alternatively, the ability of the Enterprises to achieve geographic diversity of the risks associated with their off-balance sheet obligations could mitigate this concentration risk to some degree.

In 2004 and 2005, despite increased Office of Federal Housing Enterprise Oversight (OFHEO) scrutiny because of accounting and operational deficiencies, Fannie Mae and Freddie Mac embarked on aggressive strategies to purchase mortgages and mortgage assets with questionable underwriting standards. For example, they purchased a large volume of what are known as Alt-A mortgages, which typically did not have documentation of borrowers' incomes and had higher loan-to-value or debt-to-income ratios. Furthermore, as shown in figure 2, Enterprise purchases of private-label MBS, including MBS collateralized by subprime and Alt-A loans, increased rapidly as a percentage of retained mortgage portfolios from 2003 through 2006. By the end of 2007, the Enterprises collectively held more than $313 billion in private-label MBS, of which Fannie Mae held $94.8 billion and Freddie Mac held $218.9 billion.

Figure 2: Total Private-Label Mortgage Backed Securities as Percentage of the Enterprises Retained Mortgage Portfolios, 1998 through 2007



Source: OFHEO *Report to Congress*, April 15, 2008.

According to FHFA, Alt-A mortgages and private-label MBS containing subprime and Alt-A mortgages represented a disproportionate share of credit-related losses in 2007 and 2008. For example, by the end of 2008, Fannie Mae held approximately $295 billion in Alt-A loans, which accounted for about 10 percent of the total single-family mortgage book of business (that is, mortgage assets held in portfolio and mortgages that served as collateral for MBS held by investors). However, Alt-A mortgages accounted for nearly half of Fannie Mae's $27.1 billion in credit losses stemming from its single-family guarantee book of business in 2008. At a June 2009 congressional hearing, the former FHFA Director testified that 60 percent of the AAA-rated, private-label MBS purchased by the Enterprises had since been downgraded to below investment grade.[7] He also stated that investor concerns about the extent of the Enterprises' holdings of such assets and the potential associated losses compromised their capacity to raise needed capital and issue debt at acceptable rates.

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[6] In 2008, Fannie Mae and Freddie Mac both reported derivatives losses of about $15 billion. These losses primarily resulted from a large drop in interest rates in the second half of 2008, which caused losses on derivatives used by the Enterprises to manage their interest rate risk. Interest rate risk refers to the risk that a change in interest rates could adversely affect a financial institution's profitability. For example, for a financial institution that funds longer term assets with shorter term debt, an increase in interest rates could raise the cost of borrowing relative to the interest income from its assets.

The recent crisis revealed that the Enterprises held substantially lower amounts of regulatory capital than needed to absorb losses from their risk exposures; in other words, they were excessively leveraged. Total losses for the Enterprises for 2008 alone exceeded the regulatory capital they held at the end of 2007 and both have required large capital infusions from the Department of the Treasury to remain solvent. As of March 31, 2010, Treasury purchases of preferred stock amounted to $75.2 billion for Fannie Mae (in comparison to $45.4 billion in core capital held at the end of 2007) and $50.7 billion for Freddie Mac (in comparison to $37.9 billion in core capital held at the end of 2007). Furthermore, to the extent that guarantee fees collected on issued MBS protect against losses on these guarantees, the Enterprises' underpricing of these fees also contributed to higher leverage.

2. What key factors contributed to the Enterprises' use of excessive leverage?

Weak market discipline and relatively low regulatory capital requirements were two key factors that allowed Fannie Mae and Freddie Mac to take on excessive leverage. In addition, changes in the Enterprises' housing goals and incentives to deliver competitive returns for shareholders may have encouraged them to assume greater risks relative to their capital, but the relative significance of these factors is subject to debate.

First, with respect to market discipline, the implied government guarantee of the Enterprises' obligations weakened the incentives of creditors and other market participants to discourage excessive risk-taking by the Enterprises. Despite the federal government explicitly not guaranteeing the Enterprises' debt and MBS or including them in the federal budget, financial market participants assumed an implied federal guarantee, which enabled the Enterprises to borrow at lower rates than other for-profit corporations. This implicit government guarantee and access to less costly credit created moral hazard. That is, it encouraged the Enterprises to assume greater risks and hold less capital than would have been the case in the absence of such a guarantee, making financial losses more likely.

This potential for moral hazard heightened the importance of constraining the Enterprises' risks through regulatory requirements and oversight. However, prior to the conservatorships, Fannie Mae and Freddie Mac were subject to relatively low capital requirements. They were required to hold minimum capital equal to 2.5 percent of their balance sheet assets plus 0.45 percent of their off-balance sheet obligations. In comparison, bank holding companies generally have held capital in excess of 4 percent of their total assets to qualify as well-capitalized. OFHEO introduced a new risk-based capital requirement in 2002. However, in creating the stress test to determine the requirement, OFHEO was severely constrained by statutory provisions it was required to follow. As a result, required risk-based capital has never been binding for the Enterprises. That is, the required risk-based capital has never exceeded the minimum non-risk based requirement. In a recent testimony, Armando Falcon, a former Director of OFHEO, stated that OFHEO had limited discretion over the Enterprises' capital requirements and used supervisory agreements in connection with remediating accounting violations as an opportunity to reduce the Enterprises' leverage. In 2004, under these supervisory agreements, the Enterprises agreed to maintain a 30-percent surplus above their minimum capital requirements due to their operating risk exposure and deficiencies in internal controls, systems, and accounting. Although a required surplus remained in effect in the years leading up to conservatorship, the additional capital proved to be insufficient to protect against the large credit losses the Enterprises would suffer in 2008 and 2009.[8] An economist with whom we spoke noted that the minimum capital requirements for the Enterprises were put in place when they operated under a safer business model and did not provide adequate protection against their increasing exposure to lower quality mortgage assets.

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[7] House Committee on Financial Services, Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises, testimony of James B. Lockhart III, "The Present Condition and Future Status of Fannie Mae and Freddie Mac," 111th Cong., 2nd sess., June 3, 2009.

Regulatory officials and other observers have offered different views on the relative significance of certain factors that may have encouraged Fannie Mae and Freddie Mac to take on greater risks. According to some observers, the 2004 increase in housing goals provided the Enterprises with incentives to purchase mortgage assets, such as Alt-A mortgages and private-label MBS collateralized by subprime and Alt-A mortgages, which in large degree served targeted groups of home owners. However, the former FHFA Director stated that the Enterprises' primary motivation in purchasing such assets was to restore their share of the mortgage market, which declined substantially from 2004 through 2007 as the market for "nontraditional" mortgages such as subprime rapidly grew. FHFA officials further stated that the Enterprises viewed such mortgage assets as offering attractive risk-adjusted returns. One economist with whom we spoke also said that as for-profit corporations, the Enterprises may have taken on additional leverage to achieve more competitive returns for shareholders.

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[8] In addition, in 2008, both Enterprises recorded large valuation allowances against deferred tax assets, which reduced their capital.

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A Fannie Mae Political Reckoning

Democrats fear a Senate measure to reform the failed mortgage giants.

REVIEW & OUTLOOK

MAY 6, 2010

One sign that the White House financial reform is less potent than its advertising claims is that it doesn't even attempt to reform the two companies at the heart of the housing mania and panic, Fannie Mae and Freddie Mac. So we're glad to see that yesterday GOP Senators John McCain, Richard Shelby and Judd Gregg introduced a Fan and Fred reform amendment that will let Democrats show if they're serious about reducing reckless lending and taxpayer risk.

The Financial Crisis Inquiry Commission spent yesterday focusing on financial "leverage," using Bear Stearns as an example. But Fannie and Freddie were twice as leveraged as Bear, and much larger as a share of the mortgage market. Fan and Fred owned or guaranteed $5 trillion in mortgages and mortgage-backed securities when they collapsed in September 2008. Reforming the financial system without fixing Fannie and Freddie is like declaring a war on terror and ignoring al Qaeda.

Unreformed, they are sure to kill taxpayers again. Only yesterday, Freddie said it lost $8 billion in the first quarter, requested another $10.6 billion from Uncle Sam, and warned that it would need more in the future. This comes on top of the $126.9 billion that Fan and Fred had already lost through the end of 2009. The duo are by far the biggest losers of the entire financial panic—bigger than AIG, Citigroup and the rest.

From the 2008 meltdown through 2020, the toxic twins will cost taxpayers close to $380 billion, according to the Congressional Budget Office's cautious estimate. The Obama Administration won't even put the companies on budget for fear of the deficit impact, but it realizes the problem because last Christmas Eve it raised the $400 billion cap on their potential taxpayer losses to . . . infinity.

Moreover, these taxpayer losses understate the financial destruction wrought by Fan and Fred. By concealing how much they were gambling on risky subprime and Alt-A mortgages, the companies sent bogus signals on the size of these markets and distorted decision-making throughout the system. Their implicit government guarantee also let them sell mortgage-backed securities around the world, attracting capital to U.S. housing and thus turbocharging the mania.

The virtue of Mr. McCain's amendment is that it will give Senators a chance to vote on the kind of reform that Congress blocked for so long, notably with Senator Barack Obama helping the blockade. The amendment mandates that the current government conservatorship of Fan and Fred will end within 30 months. In the meantime, the companies will have to reduce their mortgage portfolios by 10% each year. If the terrible twosome can't stand on their own after conservatorship, they would then go into receivership and be liquidated.

If they can survive on their own, they would have three years before the expiration of their federal charters, during which time they would have new operating restrictions. Messrs. McCain, Shelby and Gregg would repeal the affordable housing goals previously legislated for Fan and Fred and which contributed to their terrible mortgage bets, and the companies would have to reduce the mortgage assets held on their books by nearly 50% within two years and raise their capital standards.

Fannie and Freddie would also have to start paying state and local sales taxes, lose their exemption from full registration at the Securities and Exchange Commission when they issue securities, and start paying fees to repay the taxpayer for the value of federal guarantees. The $400 billion limit on taxpayer assistance would be reinstated, and for as long as they are in federal conservatorship or receivership, they would have to be included in the federal budget.

In short, the McCain amendment precisely targets the problems that caused the mortgage crisis: If the housing giants are no longer subsidized, they will become small enough to fail. That means they will stop lending money to people who cannot afford to pay them back, and in turn they will stop endangering taxpayers.

This is a genuine anti-bailout vote, and you would think Democrats would be more than happy to go along given their claims that they want to stop bailouts. Yet Republicans aren't even sure that Majority Leader Harry Reid will allow a vote on the McCain measure lest Democrats get pressure from the White House to oppose it. They would then reveal that their reform is less about reducing risk than about giving the political class more control over the financial status quo.

Bloomberg

Freddie Mac Stock Falls After Seeking $10.6 Bln From U.S.

By *Lorraine Woellert - May 06, 2010*

Freddie Mac, the mortgage company operating under U.S. conservatorship, fell 8 percent in New York trading after requesting $10.6 billion more in Treasury Department aid while reporting a first-quarter loss.

The news spurred Republicans to renew criticism of Democrats for excluding McLean, Virginia-based Freddie Mac and Fannie Mae, its Washington-based rival, from financial-rules legislation being debated in Congress.

Freddie Mac asked for aid and reported a $6.7 billion first-quarter loss in a Securities and Exchange Commission filing yesterday. The new request would add to the $50.7 billion in taxpayer aid the company has received since November 2008.

The company's shares fell 11 cents to $1.32 at 12:21 p.m. in New York Stock Exchange composite trading.

Freddie Mac and Fannie Mae have borrowed almost $137 billion from the Treasury since U.S. regulators seized the two government-sponsored enterprises in September 2008, after rising delinquencies and foreclosures pushed them to the brink of collapse.

"We had 137 billion reasons why this government-sanctioned duopoly needed to be terminated," U.S. Representative Jeb Hensarling, a Texas Republican, said in a telephone interview yesterday. "Today we have 10 billion more reasons."

House Republicans led by Hensarling are pushing to eliminate government subsidies for the two companies and repeal their affordable-housing mandates. Republican Senators Richard Shelby of Alabama, John McCain of Arizona and Judd Gregg of New Hampshire are aiming to include a similar provision in financial-rules legislation being debated in the Senate.

'Made a Choice'

Treasury Secretary Timothy F. Geithner said the Obama Administration "made a choice" not to seek legislation to address Fannie Mae and Freddie Mac this year.

"We thought, frankly, we'd get a better outcome, a more thoughtful effort, more commitment to reform, if we were further ahead in the process of repairing the damage to the housing markets," Geithner told the Senate Finance Committee on May 4.

The Congressional Budget Office in January estimated that direct U.S. aid to the GSEs may total $389 billion by 2019. In addition, the Treasury and the Federal Reserve last year spent $1.4 trillion to buy the companies' mortgage-backed securities.

Representative Scott Garrett, a New Jersey Republican, criticized Democrats for not addressing the financial state of the companies, which own or guarantee about $5 trillion in mortgage assets, after the worst economic crisis since the Great Depression.

"I find it mind-blowing that Democrats reject the opportunity to engage in a serious conversation about reforming the entities that are clearly the government's biggest toxic liabilities," Garrett said in a written statement.

Frank Memo

In a May 4 memorandum to White House Chief of Staff Rahm Emanuel, House Financial Services Committee Chairman Barney Frank, a Massachusetts Democrat, said the Republican attacks were "a diversionary tactic to organize their opposition to financial reform."

Frank's memorandum, which also was copied to Housing and Urban Development Secretary Shaun Donovan and Senate Banking Committee Chairman Chris Dodd, a Connecticut Democrat, said the party should "fight back against the misrepresentations."

Freddie Mac said it provided foreclosure alternatives for more than 71,000 households and helped refinance $68 billion in single-family mortgages in the first quarter.

"In this difficult economic environment, the stability that Freddie Mac brings to the mortgage market is especially vital," Chief Executive Officer Charles E. Haldeman Jr. said yesterday in a statement. The company continues to strengthen underwriting and improve credit quality, he said.

Freddie Mac and Fannie Mae were charted by the government to boost homeownership by buying mortgages from lenders and providing a government guarantee of principle on underlying mortgages. The companies financed or guaranteed more than 70 percent of new single-family mortgage loans in 2009.

To contact the reporter on this story: Lorraine Woellert in Washington at lwoellert@bloomberg.net.

The New York Times

May 5, 2010

Freddie Mac Seeks Billions More After Big Loss

By THE ASSOCIATED PRESS

WASHINGTON (AP) — Freddie Mac is asking for $10.6 billion in additional federal aid after posting a big loss in the first three months of the year.

The new request will bring the total bill for rescuing Freddie Mac, which has been effectively owned by the government since nearly collapsing in September 2008, to $61.3 billion.

Freddie Mac said Wednesday that it lost $8 billion, or $2.45 a share, in its first quarter. The results compared with a loss of $10.4 billion a year earlier. The most recent quarter includes $1.3 billion in dividends paid to the Treasury Department.

The company, however, cautioned that new accounting standards made it difficult to compare the most recent quarter with the year-earlier period. In the first quarter of this year, Freddie Mac was forced to bring $1.5 trillion in assets and liabilities onto its balance sheet, causing the company's net worth to fall by $11.7 billion.

Nevertheless, the company's chief executive, Charles E. Haldeman Jr., said, "We are seeing some signs of stabilization in the housing market, including house prices and sales in some key geographic areas."

Mr. Haldeman cautioned, though, that the housing market "remains fragile with historically high delinquency and foreclosure levels" and high unemployment.

Created by Congress, Freddie Mac and its sibling company, Fannie Mae, buy mortgages from lenders and package them into bonds that are resold to global investors. As the housing bubble burst, they were unable to raise enough money to stay afloat, and the government effectively nationalized them.

The total taxpayer bill for both is now about $136 billion.

POLITICO

Frank to White House: Fight the GOP

By: Eamon Javers
May 5, 2010 03:28 PM EDT

House Financial Services Committee Chairman Barney Frank is worried that the GOP is scoring points with its attacks on housing giants Fannie Mae and Freddie Mac, and he's urging the White House to fight back.

Frank (D-Mass.) sent a two-page memo Tuesday evening to Obama administration officials urging them to return fire to defend the Wall Street reform bill.

In the memo, a copy of which was obtained by POLITICO, Frank made the case that Freddie and Fannie are being managed responsibly, and aren't doing further economic damage to themselves now that they've been taken over by the government.

But events late Wednesday made it politically difficult for Frank to make that case – Freddie Mac reported that it had lost $8 billion for the quarter and would likely need more than $10 billion in additional aid from the government. Frank staffers say that's because Freddie is still suffering from bad decisions it made in the past, even though it is making wiser choices now.

"The point of Chairman Frank is making in his memo is that they are not losing money on operations since being taken into conservatorship by [President] Bush," said Frank spokesman Steve Adamske late Wednesday, after the Freddie results were made public. "The losses, as we understand it, were from business decisions before the takeover."

Still, Republicans were quick to pounce, saying the losses reported by Freddie Mac prove that something needs to be done about the housing giants.
"As the old saw goes, everyone is entitled their opinion, but no one is entitled to their own set of facts," said Michael Steel, the spokesman for House Republican Leader John Boehner (Ohio).

In the overall messaging wars, Frank wrote in his memo, Republicans have decided to fight Wall Street reform by arguing that the bill is not complete because it doesn't reform Fannie and Freddie, whose failures were at the heart of the financial meltdown.

“They have gained a lot of traction with that argument,” Frank wrote of his Republican critics, “in part because we did not fight back against the misrepresentations early enough. I want to be sure that we do not repeat this pattern.”

Frank’s missive was addressed to White House Chief of Staff Rahm Emanuel, HUD Secretary Shaun Donovan, Treasury Secretary Timothy Geithner, and Senate Banking Committee Chairman Chris Dodd (D-Conn.).

Freddie and Fannie have become a central rallying cry for Republicans who have said over and over again in recent weeks that the bill now on the Senate floor fails to cover the housing sector. Now Sen. John McCain and others are poised to offer an amendment that would force the United States to give up its control over the beleaguered financial firms, which collapsed into government conservatorship in 2008.

In an April 23 letter to Senate Republicans, for example, Rep. Jeb Hensarling (R-Texas) urged them to oppose the bill because it sidesteps Fannie and Freddie. “Perhaps the most glaring shortcoming in this legislation is what is not included,” Hensarling wrote, “fundamental reform of the two largest recipients of taxpayer bailouts, Fannie Mae and Freddie Mac.”

A White House official said of Frank’s letter, “We’re grateful to Chairman Frank’s leadership on financial reform that led to the passage of a strong reform bill in the House, and we always appreciate his input on this issue.” Geithner has argued that Freddie and Fannie are enormously complicated to unwind and therefore the Obama administration will address them in a separate legislative effort.

But Frank argues that Democrats have the facts on their side, and then need to do a better job of communicating them.

Freddie and Fannie have already been reformed, to some extent, by virtue of being placed into conservatorship.

“So the argument that we have ignored the need to change the operation of Fannie and Freddie in our rush to do financial reform is of course exactly backwards,” Frank wrote. “We did Fannie and Freddie first.”

Frank also wrote that the Republican proposal to abolish Freddie and Fannie would remove an important government prop to the housing market. "It is the unanimous view of every profit and nonprofit entity concerned with the housing market in the United States that simply to abolish Fannie and Freddie, as the Republicans are proposing in the House bill, and not do anything to replace the functions they are now performing with a conservatorship, would be a disaster for housing, and therefore for the economy as a whole," Frank said.

Finally, Frank said that Freddie and Fannie are not losing money as they are currently operated – which means they aren't making the deficit any worse.

"This is an important point that has to be repeated – as Fannie and Freddie operate today, going forward, there is no loss," Frank wrote. "The losses are the losses that occurred before we took the first step towards reforming them – we the Democrats – and nothing we could do today will diminish those losses."

In Wednesday's earnings report, however, Freddie Mac said is lost $6.7 billion and was obliged to pay $1.3 billion in dividends on senior preferred stock held by the US Treasury.

"Our first quarter 2010 financial results were driven significantly by the required adoption of new accounting standards, along with continued weakness in the housing market," said Ross J. Kari, Freddie Mac's chief financial officer.

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LONG-RUN CREDIT GROWTH IN THE US

Forthcoming: JOURNAL OF ECONMICS AND BUSINESS

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LONG-RUN CREDIT GROWTH IN THE US

ABSTRACT

The paper explores the long term income elasticity of consumer and mortgage credit growth since World War II. It also examines other economic factors, to determine whether recent credit use is anomalous. Two-stage least squares shows consumer credit income elasticity to be slightly below 1.0, taking other factors into account. A vector autoregressive error correction (VAREC) model for cointegrated variables with unit roots determine short-run and long-run credit impact multipliers which are consistent with the elasticities. Except for 1974-1979, the long-run consumer credit impact multiplier of 0.23 is very close to the debt-income limit that Enthoven projected as long ago as 1957. These results are very different from the simplistic media perspectives.

I. INTRODUCTION

Many observers blame the recent credit crunch and associated volatility in financial markets as arising in large part from two circumstances: some consumers' misuse of credit and some lenders making credit available to borrowers who were unlikely to be able to satisfy their credit obligations in the long run. Before the credit crisis, it appeared that these consumers might be able to satisfy their obligations because (1) many borrowers with large obligations only needed to pay the interest on their loans, with no principal repayment, and (2) both consumers and lenders assumed housing prices would increase substantially before payments adjusted to higher levels, allowing consumers to refinance as needed. In some cases, mortgage borrowers were not even obligated to pay all of the interest on their mortgages: their commitments were scheduled to "reset" to require higher interest payments plus principal amortization that they might not be able to afford, but the resets were scheduled for later, when house prices (and the borrowers' incomes) were expected to have risen.

Much of the recent discussion of the amounts of new mortgage debt advanced and lenders' practices in extending it mirrors similar kinds of complaints about profligate consumers and over-eager lenders leveled at non mortgage consumer credit market participants for decades, notably including credit card users and providers in recent years. But because of recent widespread concern about debt growth, it is an ideal time to reexamine the long run experience concerning consumer's use of both consumer and mortgage credit. Consequently, this paper examines empirically the long term trends of how American consumers have used consumer and mortgage credit. The empirical emphasis is on real, rather than nominal, levels of credit, adjusting for inflation. Whenever a recession appears to be on the horizon or when financial markets are somewhat volatile, the media portrays the American consumer as being overextended in credit markets, but these reports usually do not adjust for growth in disposable incomes and other factors and/or increases in prices over time. They also do not note how current cyclical experience relates to longer term trends. More technically, there are surprisingly few recent analytical research studies to support or to dispel the reports of long term explosive use of consumer and mortgage credit often found in the popular press, despite the attention to short term fluctuations in aggregate consumer debt (CC + MC) and its components, and their impacts on volatility in the financial markets.[1]

Section II reviews trends in credit and other related macro-economic variables over the past 60 years. It provides a foundation for analysis of long run credit trends by examining some basic perceptions and reviewing two of the major, older analytical studies on consumer credit growth. Reviewing these older studies partly reflects the relatively limited analytical attention that the subject has received, but these older studies also provide the basis for hypotheses that continue to be relevant. The data and long term credit trends are discussed in Section III as a basis to develop dynamic credit models. The dynamic autoregressive models with error corrections, parameter estimates, and impact multipliers for consumer and mortgage credit are developed in Section IV, which includes discussion of the degree to which credit growth in 2007-2008 was predictable from prior experience. Section V provides an application of the model to forecast the credit levels for the unusual years of 2007 and 2008. The conclusions follow in Section VI.

II. PERCEPTIONS AND EARLY STUDIES

Perspectives on Long Term Growth

Although the Federal Reserve's Flow of Funds Accounts clearly show that the consumer sector of the U.S. economy is actually a net lender in financial markets (usually through financial intermediaries), households still borrow substantial amounts for housing, durable goods, education, and other purposes. Continuing a long term trend toward higher nominal debt levels, borrowing by households grew sharply in the cyclical expansions of the past few decades. For example, total non mortgage consumer credit outstanding (CC), which is an important component of household liabilities, increased more than ten fold over the period 1975-2006 and approximately tripled in real terms (see Table 1), thereby providing financing for a significant portion of major consumer outlays during those years. Many other household economic measures have also risen sharply over this period and generally in the years since World War II, including employment, income, assets, and wealth.

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[1] See references for a bibliography, including a few studies not otherwise referenced here.

TABLE 1 HERE PLEASE

Despite the obvious cyclical contribution of credit availability to support the expansion of consumer spending (and economic growth), the increase of consumer debt in cyclical upswings inevitably leads to expressions of concern.[2] Because the periods of most rapid growth in consumer credit usually occur early in the business cycle, later cyclic stages are perennially subject to the contention that consumer debt has risen "too fast" or that the level has become "too high." Doomsayers assert that high and increasing debt levels lead inevitably to overindebtedness and are likely to cause delinquencies, a spending slowdown, recession, and rising unemployment. Some of this concern is directed towards housing-related debt, especially recently in the subprime area, but much concern aims also at consumer credit, in the recent past decades particularly at credit card debt. Certainly, communications media pronouncements about consumer credit growth have generally been dismal (see Durkin and Jonasson, 2002). It is difficult to estimate how influential such statements have been, if at all, but even the casual empiricism of asking one's neighbors for their views of the domestic credit picture reveals the widespread notion that consumers' credit use has grown too fast for too long.

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[2] See, for example, front-page articles in the Wall Street Journal for June 17, 1964, January 29, 1970, March 26, 1973, June 28, 1977, December 2, 1985, and February 2, 1987, for some older expressions of concern. More recently, see August 2008 – January 2009 series "The Debt Trap" in the New York Times.

One possible cause for consumer credit growth is the hypothesis of consumer profligacy and some sort of inexorable desire to live beyond one's means. Other possible explanations for credit growth range from statistical artifacts associated with how the data are collected to changing population demographics and generally greater macro-economic stability after the Great Depression and World War II that have produced a greater willingness to accept risks sometimes associated with increased leverage to support larger portfolios of productive assets.

There is also the possibility that leverage, or more properly the asset accumulation that greater leverage assists, is a luxury good where an income elasticity greater than unity might reasonably be expected. There is no reason why debt measures should remain the same as income rises. Credit, or at least large purchases like housing, large durable goods including vehicles and appliances, home modernization, college educations, and major hobby items often associated with credit use are mainly luxury goods. As such, they are precisely the kinds of purchases that might be expected as income rises. Under these circumstances, then credit use would also reasonably be expected to rise as income rises. This paper does not explicitly attempt to model the behavioral foundations of such a possibility, but presents an empirical approach to exploring correlates of postwar credit growth and explaining the trends empirically.

FIGURE 1 HERE PLEASE

Figure 1 shows annual percentage growth rates for consumer and mortgage credit 1946 - 2006. It is immediately apparent that credit growth has not been steady: annual growth rates have fluctuated substantially over the business cycles. More interesting is how the cyclical episodes have been relatively similar, excluding the unprecedented and unduplicated upheavals associated with the aftermath of the Great Depression of the 1930s and the period of consumer credit restrictions during World War II. Annual growth of consumer credit outstanding peaked in each of the other cyclical episodes of the post World War II period at roughly a 15-19 percent growth rate for a short period in each upswing. The all time postwar highs occurred in the earliest post World War II period when consumer credit was responding to the end of wartime controls during the 1940s. The postwar annual growth rate in mortgage credit has been somewhat less sharp in its cyclical fluctuations in the postwar period, reaching a peak growth rate of 16-17 percent in the early 1950s and again in the 1970s. There has not been a recent sharp increase in the growth rates in either series. Although the relatively consistent pattern does not provide a forecast, it is an indication that the growth of consumer and mortgage credit in recent decades is not anomalous or startling in percentage terms. Consumer and mortgage credit outstanding grew rapidly in recent cyclical upswings, but they always have done so in upswings. The question is what economic conditions and variables are associated with consumer and mortgage credit growth.

Enthoven and Hunter Studies

Relatively few econometric studies have examined the long term growth of consumer credit.[3] Two of the most interesting papers were published more than a generation ago by Alain Enthoven (1957) and Helen Manning Hunter (1966). There are subsequent studies (many in the bibliography), but few are as interesting or insightful.

Enthoven was not attempting to model consumer credit use behavior explicitly, but he designed a dynamic model based on cross section evidence of consumers' credit use to explain the rapid growth of consumer credit and the rise of the debt-income ratio after World War II that caused so much concern in the mid 1950s. He assumed the future economy would be characterized by increasing aggregate income due both to increasing population and rising household income. If consumer credit use were chiefly among younger families as the cross section evidence suggested, then credit outstanding would increase as the population increased. Enthoven postulated a dynamic growth model to demonstrate the implications of these basic assumptions. The solution to his first-order differential equation showed that the debt-to-income ratio would approach a long run asymptotic stable limit from below, dependent upon (1) the ratio of the growth of consumer credit relative to income and (2) the growth rate of income itself.

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[3] For discussion of consumer credit growth and especially its cyclicality, see Prell (1973), Luckett and August (1985), and Johnson (2005). There is further discussion of relevant studies at greater length in Durkin, Elliehausen, Staten, and Zywicki (2010), Chapter 2.

Using the debt and income growth experience for 1945-1956 as the basis of his parameters, Enthoven derived the conclusion that the long term expectation for the ratio of consumer installment credit to income was approximately 19 percent. Since this asymptotic ratio was higher than the aggregate installment credit to income ratio at the time (it was between 9 and 10 percent in 1954-1956), he concluded that the ratio could continue to rise for some time, despite contemporary concern over credit growth.

FIGURE 2 HERE PLEASE

Despite the simplicity of Enthoven's growth model, it is useful. His prediction has been quite consistent with experience. Although consumer credit growth has been intensely cyclical over the past five decades, and his model is based on a simple (non cyclical) growth path, the aggregate consumer credit to income ratio (the only available consumer credit measure today) appears to have approached an asymptotic limit of 20-25 percent (see Figure 2), only a bit above Enthoven's 1957 projection, based only on installment credit. Data on non installment credit like department store charge cards, which were more important 50 years ago, were available separately then and might have been included. This would have raised the asymptote somewhat.

Consumer credit outstanding has never exceeded the prediction of his model by very much, and still does not (Figure 2). The ratio of consumer credit outstanding to income converged with the path of the level predicted by a rolling Enthoven model (using moving averages for each of the necessary parameters) by the early 1970s, and the two ratios have tracked one another remarkably closely since that time. An "adjusted" actual consumer credit ratio to income, the third line in Figure 2, assumes that 15 percent of aggregate revolving consumer credit arises in the official statistics from "convenience use" of credit cards, that is, balances that some consumers will pay in full upon receipt of the bill. This series hypothetically eliminates non installment credit from consumer credit and tracks the reconstructed Enthoven limit even more closely than the trend constructed using the official statistics. At year-end 2006, consumer credit outstanding relative to income exceeded the limit predicted by the rolling 1957 model by less than three percentage points, despite decades of contentions that consumer credit has grown "too fast." Relative to income, the series adjusted to remove some "convenience credit" exceeded the rolling Enthoven model by only about one percentage point (Figure 2, dotted line). Again, as with annual percentage change in consumer credit illustrated above, it does not appear that there is anything in the Enthoven perspective of consumer credit trends which suggests that credit experience until 2006 was in any way anomalous.

About a decade after Enthoven's contribution, Helen Manning Hunter (1966) developed a behavioral model of the long term growth of consumer credit based upon her interpretation of relationships revealed in consumer surveys of credit use. Her goal was to employ existing evidence of individuals' credit use to develop hypotheses explaining the high growth of aggregate consumer credit relative to disposable income over the years 1910-1962. This is the same issue explored by Enthoven, although he focused on the postwar period, and he did not try to develop or to estimate the parameters of a behavioral equation.

Based upon the findings of earlier cross section studies by Lansing, Maynes, and Kreinin (1957) and Miner (1960), Hunter hypothesized that liquid asset holdings, income, change in income, and life cycle stage of individual consumers were the most relevant variables to explain credit growth. She estimated an equation where various measures of consumer credit outstanding or extended were a function of population, average income, and liquid assets.

Hunter's parameter estimates probably do not exhibit long run stability to the 21st century because they depended so much on the depression years of the 1930s and the immediate postwar years, 1946 through the 1950s. She excluded war years 1917-1919 and 1942-1945 as probably abnormal. However, Hunter's analysis of the relevant underlying variables remains useful. Credit use is related to population and income growth, as Enthoven suggested, and possibly to liquid asset changes, even if income elasticity of credit growth does not appear to be as high as Hunter found, now that the effects of the depression of the 1930s and wartime credit restrictions of the 1940s and early 1950s are more distant. Re-estimation of an updated Hunter type equation may have explanatory power over the longer postwar period. Both Enthoven and Hunter demonstrate an important role for income growth in explaining consumer credit growth (income elasticity).

Enthoven's and Hunter's results, as well as the dramatic changes in US financial markets, products, institutions, wealth, and population since their publication, make this a particularly interesting time to explore whether consumer and mortgage credit have recently increased relative to other economic factors. As indicated, the media continue to portray credit usage as being out of control whenever business cycles and economic conditions appear to deteriorate. Much of the time there is no distinction between short term and long term trends.

III. DATA AND TRENDS

Data

Over the long term, both real consumer credit excluding mortgage credit and real consumer credit probably have been influenced by a wide range of factors that can be classified either as macroeconomic influences or consumer factors (Table 2). Most of the variables in the table potentially reflect both supply and demand influences, as necessary for a truly long run analysis.[4] Data for most of these variables are available in the Federal Reserve Flow of Funds Accounts; these extensive time series permit a long-run perspective on some of the questions that Enthoven, Hunter, and others have considered. These data allow a truly long run analysis that spans numerous business cycles and recessions, periods of considerable economic growth, several war periods, housing bubbles, and credit crunches. The Flow of Funds data are updated and revised regularly so that definitions are as consistent as possible over time and trends can be identified that may not be evident from other sources or over shorter periods.

TABLE 2 HERE PLEASE

Regression Models

To examine consumer and mortgage credit growth in a multivariate framework, linear and log-linear regression models are estimated for 1946 – 2006 to test influences of variables that Hunter explored. The log-linear models are easier to interpret and make more sense for a lengthy time series because the coefficients are directly observable long run elasticities. To estimate elasticities for the linear models, the slopes must be evaluated at a particular point in time, such as the mean of the time series, which provides elasticity at approximately the midpoint between 1946 and 2006. The midpoints in these time series (approximately 1976) are not of particular interest or significance, relative to the whole credit time series.

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[4] In an interesting paper, Gross and Souleles (2002) found an influential role for supply changes in the form of credit line increases and interest rate changes in their micro study of credit card credit, but they did not have information on consumer demand influences and the study concerned only a short segment, approximately one year, of one business cycle episode.

For many consumers, levels of consumer and mortgage credit may be jointly determined. This is tested by estimating two-stage as well as ordinary least squares models. Consumer credit is expected to be influenced by mortgage credit levels, but the reverse is not so likely. After obtaining a new mortgage, purchasers may pursue additional consumer credit to settle into the abode, to maintain it, and to satisfy the desires associated with home ownership. After increasing consumer credit significantly, however, it is not so likely that a borrower will be able to obtain new mortgage credit, unless a prospective borrower has significant other assets.

The substantive hypothesis for this approach and the foundation for the dynamic credit models is that consumer and mortgage credit each grow with real disposable income and that there may be other important explanatory factors for each. The factors may or may not be the same for consumer and mortgage credit. Preliminary tests show that mortgage credit levels influence consumer credit but not vice versa. Consequently, two stage least squares is applied to estimate growth elasticities for consumer credit but not for mortgage credit. The classical auto-regressive transformations are employed to remove autocorrelation.

Tests show that the log linear models also have higher coefficients of determination, and so the linear models are eliminated from further consideration. The results for these log linear models are presented in Appendix Tables A.1 - A.4.

Results show that the consumer credit income elasticity is 0.97 and mortgage credit income elasticity is 0.54 for 1946 – 2006 (Table 3), taking other economic factors into account. In other words, neither suggests long term explosive credit growth relative to income, after taking account of other factors, despite the cyclicality of credit growth that sometimes produces rapid growth for a period of time. Other significant explanatory variables include long term interest rates – represented by the corporate AAA bond rate (CORPAAA), total consumer assets in real terms (TA/CPI), and unemployment. As expected, higher real incomes, lower long term interest rates (costs of funds), and greater levels of consumer assets explain larger amounts of mortgage credit outstanding using this approach. Consumer credit outstanding is not a significant explanatory factor for mortgage credit, but, as expected, mortgage credit is significant in explaining consumer credit growth, the reason for using two stage least squares for the consumer credit equation. The percentage of variation of the dependent variable that is explained by the models is .99 for each model with AR(1) and AR(2) corrections.[5]

TABLE 3 HERE PLEASE

The equations are also estimated including a series of binary variables representing the individual business cycles of post World War II to examine any anomalous cyclic episodes. Table 4 defines binary variables to allow testing for effects of business cycles on consumer and mortgage credit models.

TABLE 4 HERE PLEASE

For the dependent variable log(real mortgage loans), none of the intercept or slope binary variables has a statistically significant coefficient. Table 5 provides consumer credit log linear models that include the binary variables defined in Table 4. Except for 1990-2000, the coefficients of binary intercept and slope variables (IV9000 and IV9000*RDPI, respectively) are not statistically significant, and then only for consumer credit. For this period, the income elasticity of consumer credit growth is 1.6141 (.9997 +.6144). Much of the growth in consumer credit during this period is due to growth in the use of credit cards. Johnson (2005) studied this period in more detail and concludes that declines in credit card interest rates in a competitive environment, greater availability of credit cards to riskier borrowers during these years, and growing use of credit cards for transactions purposes (as opposed to credit use) led to increased card credit in the official statistics. These explanations fall well short of runaway consumer profligacy. Because wealth effects are also a possibility, asset and wealth levels and the University of Michigan Consumer Sentiment Index are included in the specification. Total assets proved statistically significant at the .05 level in the mortgage credit but not in the consumer credit equation.[6]

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[5] A variety of additional explanatory variables from Table 2 were tested to examine possible associations with real consumer and mortgage credit levels (Tables A.3 and A.4). None of consumer wealth, financial assets, debt, or liquid assets variables improve the model over the specifications in Table 3. Structural variables test whether or not it was a war year, whether or not the 1986 tax revisions had an impact on mortgage or consumer credit outstanding, the effects of levels of consumer confidence, represented by the University of Michigan survey, and whether or not it was a recession year. The only significant factor over the long period was whether the economy was in a recession year, and when this consideration was included, the significance of the coefficient of real assets deteriorates relative to other specifications.

TABLE 5 HERE PLEASE

Although these results provide income elasticities for consumer and mortgage credit, they do not reveal whether the individual credit time series are stationary (with no unit root) or whether the two credit measures are cointegrated. These issues are explored, along with dynamic models, in the following section.

IV. DYNAMIC MODELS

To explore more fully, long term growth of consumer and mortgage credit, separately and jointly, vector autoregressive models are developed below. Vector autoregressive estimators with error correction (VAREC) provide dynamic long term economic models and credit impact multipliers. The VAREC models are formulated from the log-linear OLS and two stage regression models in Table 3. VAREC models allow tests of joint long-term growth of consumer and mortgage credit. The process requires tests for unit roots, cointegration, and VAREC parameter estimates.

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[6] A series of events from 1978 to the early 1980s eliminated rate ceilings (usury ceilings) from credit cards (Supreme Court case Marquette National Bank of Minneapolis vs. First of Omaha Service Corp., 439 U.S. 299), mortgage credit (Monetary Control Act, 12 U.S.C. 226), and some other kinds of credit in some places (various state actions). These actions enabled lenders to continue to offer credit products when interest rates rose, and over time they contributed to making credit markets more competitive overall. During the years after these events, interest rates generally fell, however, and the impact of growing competition likely was gradual. In any event, changes during these years would be accounted for in the equations by the TAX86 variable, which equals 1 for these years and 0 otherwise. Likewise, technological change in credit management during these years due to advances in statistical credit scoring methodologies that also likely enhanced competitive conditions would be accounted for by the same variable.

Tests for Unit Roots and Cointegration

Figure 1 shows that real consumer credit excluding mortgage credit (RCC = CC/CPI) and real mortgage credit outstanding (RMC = MC/CPI) have both grown extensively since 1946. This evidence suggests two hypotheses for dynamic analysis:

H1: RCC and RMC are non-stationary with one unit root, or integrated of order one, I(1)

H2: RCC and RMC are cointegrated.

Testing H1 requires an Augmented Dickey – Fuller (ADF) test. The existence of one unit root is confirmed for each series.

Letting *Z* represent RCC and then RMC, H1 is tested applying two models:

$$Z_t = \beta_0 + \rho Z_{t-1} + \beta_1 \Delta Z_{t-1} + \beta_2 \Delta Z_{t-2} + \varepsilon_t \qquad (1)$$

Equation (1) allows the ADF test for a unit root in RCC and RMC, where the null and alternative hypotheses are H_0: $\rho = 1$ and H_A: $\rho < 1$. Replacing RCC and RMC by ΔRCC and ΔRMC, respectively, for Z in equation (1), allows testing for a second unit root with the same model.

The ADF test provides t-statistics for equation (1), -2.62 for RCC and -1.63 for RMC, both of which are above the 5 percent critical value of -2.91. The null hypothesis cannot be rejected and the conclusion is that each series has a unit root. For the first differences of RCC and RMC, the t-statistics are -4.23 for ΔRCC and -3.25 for ΔRMC, which are below -2.91, so the hypothesis of a second unit root is rejected. Removing either the second lag term or the constant from equation (1), produces similar results and the same conclusion.

Since both series are I(1), whether they are cointegrated is determined using Johansen's test (Johansen, 1991). Of the various cases allowed in this testing regime, the most appropriate assumption appears to be "Series that have means and linear trends, but the cointegrating equation has only an intercept," that is, case 3 of the five possibilities for the Johansen test. The results (developed using EVIEWS 5) are summarized in Table 6. There is a single cointegrating relationship between the consumer credit and mortgage credit series

Table 6. Johansen Cointegration Tests

Hypothesized cointegrations (logRCC & logRMC)*	Trace statistic	5% critical value	probability
none	20.2629	15.49	0.0088
at most 1	0.4348	3.84	0.5097

Cointegration equations: one at 5%
* linear deterministic trend

Autoregressive Models and Impact Multipliers

A vector autoregressive model with an error correction term (VAREC) accommodates the cointegration (Engle and Granger, 1987). This model takes the general form

$$\begin{pmatrix} \Delta RCC_t \\ \Delta RMC_t \end{pmatrix} = \begin{pmatrix} \beta_{0C} \\ \beta_{0M} \end{pmatrix} + \begin{pmatrix} \beta_{1CC} & \beta_{1CM} \\ \beta_{1MC} & \beta_{1MM} \end{pmatrix} \begin{pmatrix} \Delta RCC_{t-1} \\ \Delta RMC_{t-1} \end{pmatrix} + \begin{pmatrix} \beta_{2CC} & \beta_{2CM} \\ \beta_{2MC} & \beta_{2MM} \end{pmatrix} \begin{pmatrix} \Delta RCC_{t-2} \\ \Delta RMC_{t-2} \end{pmatrix} + \begin{pmatrix} \beta_{3C} \\ \beta_{3M} \end{pmatrix} X_t + \begin{pmatrix} \gamma_C \\ \gamma_M \end{pmatrix} EC_{t-1} + \begin{pmatrix} \varepsilon_{Ct} \\ \varepsilon_{Mt} \end{pmatrix}$$

The error correction term is:

$$EC_t = RCC_t + \alpha_0 + \alpha_1 RMC_t$$

The model may include exogenous variables, *X*. Several models are estimated, including the exogenous variables listed in Table 2 and each set of binary variables listed in Table 4, to reflect the nine business cycles since World War II. Binary variables are tested to see if the intercept and the effect of log(RDPI) are different for each business cycle. No binary variable is tested for 1946 – 1952 because this period is reflected in the intercept and slope.

The most significant statistical evidence includes intercept binary values for 1974-1979 and 1980-1989 and a slope binary variable for 1974-1979 (Table 7). The t-statistic for the cointegration coefficient that includes these three binary variables is highly significant, and the binary variables are all statistically significant at a meaningful level. Including these three binary variables provides the highest R-square and the best fitting model, minimizing the system's Akaike information criterion. The statistical results for alternatives in Table 4 are summarized in Table 5 and are substantially inferior to those provided in Table 7.

TABLE 7 HERE PLEASE

Including these binary variables in the VAREC models provides results in terms of differences with lag intervals for endogenous variables ΔlogRCC and ΔlogRMC. Lag intervals must be specified for the two endogenous variables to capture the expected autoregressive responses within and between the two endogenous variables.

The following conclusions result from Table 7:

1. The logRCC and logRMC series are non-stationary but move together as shown by the earlier tests.

2. ΔlogRCC does not have an autoregressive relationship at lags 1 and 2.

3. ΔlogRMC has a positive autoregressive relationship at lag 1, a negative relationship at lag 2, and a significant negative cross correlation with ΔlogRCC at lag 1.

4. Both variables have significant positive relationships with ΔlogRDPI and significant negative relationships with CORPAAA.

5. Two binary variables (IV7479, IV8089, and the interaction IV7479*ΔlogRDPI are important for both ΔlogRCC and ΔlogRMC.

Impact Multipliers

The coefficients of Δlog(RDPI) in Table 7 are credit impact multipliers. Dynamic short-run impact multipliers for real consumer credit and real mortgage credit in response to changes in real disposable income can be determined directly from the VAREC model in Table 7. The short-run impact multipliers are the coefficients of ΔlogRDPI, except for 1974-1979 when the multipliers are the sum of the coefficients of ΔlogRDPI and IV7479*ΔlogRDPI from the VAREC models. The long-run elasticities are "equilibrium" solutions to the models in Table 7. The long-run consumer credit multiplier can be determined, assuming

$\Delta \log RCC_t = \Delta \log RCC_{t-1} = \Delta \log RCC_{t-2}$ and $\Delta \log RMC_t = \Delta \log RMC_{t-1} = \Delta \log RMC_{t-2}$,

and determining simultaneous solutions to the equations in Table 7. These results for consumer credit are in the upper panel of Table 8.

Table 8. Consumer Credit Impact Multiplier and Income Elasticity

1. VAREC results (from Table 7)

	Short-run		Long-run	
Impact multiplier	Except 1974-1979	1974 -1979	Except 1974-1979	1974-1979
Consumer Credit	0.3785	1.5081	0.2280	1.0902

2. Elasticity - Impact Multiplier Links

	Elasticity (ΔRCC/ΔRDPI) (RDPI/RCC)	Impact Multiplier (ΔRCC/ΔRDPI)	Inverse Ratio (RDPI/RCC)	Ratio (RCC/RDPI)
Consumer credit	1.01	.23	4.41	.2268

This panel shows that the long-run consumer credit impact multiplier, outside of the mid seventies, is very close to Enthoven's 1957 estimate of the limit of the debt-income ratio of 0.21

for 1946-1950, 0.17 for 1950-1956, 0.21 for 1954-1956, and 0.19 for 1945-1956. The only substantial difference is for the mid 1970s, which warrants further investigation.

The lower panel of Table 8 contrasts two-stage least squares consumer credit elasticity for 1946-2006 (from Table 3) with the long-run consumer credit multiplier from the same period derived from the VAREC models with the binary variables for 1974-1979 and 1980-1989 (from Table 7). There is consistency between the consumer credit elasticity and impact multiplier. The credit elasticity is the product of its impact multiplier and the real disposable income - real credit ratio or factor (1.01 = .23 x 4.41). The consistency is proved by comparing the inverse of the factor or ratio of real credit to real disposable income with aggregate US income data. The Flow of Funds Accounts demonstrate the aggregate ratio of these two variables has fluctuated within the relatively narrow range of .17 to .25 for more than 45 years.

V. FORECASTING 2007 AND 2008

Expectations and method

The data (1946-2006) and estimated consumer and mortgage VAREC model (Table 7) can be applied to predict the levels of RCC and RMC for 2007 and 2008. (References to RCC and RMC in this section are to ΔlogRCC and ΔlogRMC.) With the benefit of hindsight, the performance of the U.S. economy for these two years suggests that the long-term model, estimated from World War II through the economic boom of 2001-2006, should over-predict the actual levels of consumer and mortgage credit for 2007 and 2008. Since the economy began sliding into recession towards the end of 2007, only slight over-estimates would be expected for that year. Likewise, it is not anticipated that the dramatic 2008 recession would be forecast by the long-term model, given the factors taken into consideration.

Forecasting RCC and RMC for 2007, requires RCC and RMC for 2006 and 2005, estimated EC for 2006 using RCC and RMC for 2006, and contemporaneous values for RDPI and CORPAAA. Thus 2007 data were used for RDPI and CORPAAA so that the forecasts are ex-post rather than ex-ante. Similarly, the forecasts for 2008 employ revised data for 2007 for RCC and RMC, estimated EC for 2007, and 2008 data for RDPI and CORPAAA. Forecasted 2007 values for RCC and RMC could be employed in forecasting 2008, but we prefer to focus upon one-step-ahead forecasts.

Results

Table 9 shows the forecast errors for 2007 and 2008 for both consumer and mortgage credit relative to the actual values available both in December 2007 and December 2009. For 2007, the forecast RCC and RMC errors from the estimated VAREC model are 1.39 percent and 0.49 percent, respectively. The revised 2005 and 2006 values of RCC and RMC and 2007 values for RDPI provide very similar forecasts, with slightly smaller error for RCC (0.89 percent) and larger error for RMC (1.64 percent). The results for 2008 are even more interesting. The worst recession since the depression has been identified by the National Bureau of Economic Research to have begun in December 2007 and the financial crisis that followed suggest that an effective long-run model should not be expected to forecast 2008 credit levels without significant error, especially for mortgage credit. The 2008 forecast errors are 6.47 percent for consumer credit and 11.25 percent for mortgage credit, and somewhat smaller employing the revised 2005-2008 data that became available in 2009.

The 2008 forecast errors would surely be expected to be larger than the 2007 errors. According to a December 7, 2009 Federal Reserve press release, within 2008 there was considerable credit volatility. Consumer credit peaked in July 2008 at $2.6 trillion and declined for nine consecutive months; forecasts based upon shorter time periods would clearly show a different picture.

Table 9. Forecast Errors for 2007 and 2008

	Actual data available in 2007		Actual data available in 2009	
	Δlog RCC	Δlog RMC	Δlog RCC	Δlog RMC
2007	-0.0139	-0.0049	-0.0089	-0.0164
2008	-0.0647	-0.1125	-0.0626	-0.0942

VI. CONCLUSIONS

Enthoven in the 1950s and Hunter in the 1960s, contributed valuable analytical studies on long run trends in consumer credit, but there are relatively few sophisticated studies in this area since their work. The media often offer judgments about credit activity and imply that trends and circumstances have changed dramatically in recent years. This study provides a time series analysis of consumer and mortgage credit trends since World War II and shows that credit growth has not changed so dramatically since then.

A vector autoregressive error correction (VAREC) model provides short-run and long-run credit impact multipliers for consumer credit. The VAREC impact multipliers are consistent with the two stage least squares elasticities. Except for six years at the end of the seventies, the consumer credit impact multiplier of 0.23 estimated here is very close to the credit-income limit that Enthoven projected more than 50 years ago.

One test for the effectiveness of the estimated consumer and mortgage VAREC model is to examine whether it performs as expected outside of the estimation period. Forecasted levels for RCC and RMC for 2007 and 2008 should and do over-predict the actual levels of consumer and mortgage credit for 2007 and 2008. Since the current recession began towards the end of

2007, only slight over-estimates are expected and observed for that year. As expected, for 2008 credit levels are over estimated with significant error.

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Table 1. Selected Measures of Assets, Debts, and Income of American Consumers, Selected Years, 1945-2006

	1945	1955	1965	1975	1985	1995	2005	2006
				Current Dollars (billions)				
Disposable Personal Income[1]	161	283	498	1187	3109	5408	9036	9523
Total Assets	742	1569	2868	5902	16,572	32,612	64,014	68,920
Financial assets	560	1015	1954	3665	9938	21,386	38,886	42,116
Deposits	104	172	373	908	2506	3332	6049	6870
Other financial	456	843	1581	2757	7432	18,054	32,837	35,446
Total Liabilities	30	144	352	761	2360	5052	12,220	13,293
Home mortgages	19	88	219	459	1442	3325	8883	9676
Consumer credit	7	43	98	207	611	1169	2327	2438
Other liabilities	4	13	35	95	307	558	1011	1179
Net Worth	711	1425	2516	5142	14,211	27,560	51,795	53,626
				2006 Dollars (billions)				
Disposable Personal Income[a]	1803	2129	3187	4448	5825	7153	9327	9523
Total Assets	8310	11,803	18,355	22,116	31,049	43,140	66,079	68,920
Financial assets	6272	7635	12,506	13,734	18,619	28,290	40,140	42,116
Deposits	1165	1294	2387	3402	4695	4408	6244	6870
Other financial	5107	6341	10,118	10,331	13,925	23,882	33,896	35,446
Total Liabilities	336	1083	2253	2852	4422	6683	12,614	13,293
Home mortgages	213	662	1402	1720	2701	4398	9170	9676
Consumer credit	78	323	627	776	1145	1546	2402	2438
Other liabilities	45	98	218	356	575	738	1044	1179
Net Worth	7963	10,719	16,102	19,268	26,626	36,457	53,465	53,626

Source: Federal Reserve Statistical Release Z1, "Flow of Funds Accounts of the United States," various issues. Figures shown are year end, not seasonally adjusted. Some lines include assets and debts of nonprofit organizations.

[1] Measured as annual rate; figure in 1945 column is for 1946.

Table 2. Macro-Economic and Consumer Factors

Macro-Economic Factors

Variable	Definition
CPI	Consumer Price Index
DPI	Disposable Personal Income
DPI/CPI	Real Disposable Income
TBILL6	Short-term Interest Rates, Measured by the Six-Month Treasury Bill Rate
CORPAAA	Long-term Interest Rates, Measured by the Corporate AAA Rate
U	Unemployment Rate
RECYRS	Recession Years
WAR	War Years (Korea, Viet Nam, Iraq)

Consumer Factors

Variable	Definition
CC/CPI	Real Consumer Credit Outstanding, Excluding Mortgage Credit
MC/CPI	Real Mortgage Credit Outstanding, Excluding Consumer Credit
TA/CPI	Real Consumer Sector Total Assets
FA/CPI	Real Consumer Sector Financial Assets
WEALTH/CPI	Real Consumer Sector Total Wealth
TAX86	Represents 1986 Changes in Tax Laws. Variable = 0 before1986; and = 1 after 1986
MICH	Annual Index of Consumer Sentiment, Estimated by the University of Michigan Survey Research Center, Beginning in 1952
FINAS/CPI	Real Consumer Sector Total Financial Assets

Table 3. Income Elasticities of Mortgage and Consumer Credit Growth

Log-linear Mortgage Credit Ordinary Least Squares

Dependent Variable	Intercept	DPI/CPI	CORPAAA	TA/CPI	$\bar{R}^2$/F
MC/CPI	1.5550	0.5447	-0.1144	0.1384	.99
	(1.30)	(5.30)***	(-3.25)**	(2.05)*	19256.

Log-Linear Consumer Credit Two-Stage Least Squares

Dependent Variable	Intercept	DPI/CPI	CORPAAA	U	MC/CPI+	$\bar{R}^2$/F
CC/CPI	-1.6510	0.9728	-0.1056	-0.1068	0.5576	.99
	(-7.12)***	(9.70)***	(-2.80)**	(-3.30)**	(4.33)***	2906.

All variables are expressed in natural logarithms.
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
+ Estimated values from first stage.

Table 4. Business Cycle Periods and Binary Variable Definitions

Date	Period Characterization	Intercept Binary	Slope Binary
1946-1952	post WW II	0	0
1953-1959	Eisenhower years	IV5359	IV5359*DPI
1960-1969	Kennedy-Johnson years	IV6069	IV6069*DPI
1970-1973	Nixon years	IV7073	IV7073*DPI
1974-1979	Ford-Carter	IV7479	IV7479*DPI
1980-1989	Reagan years	IV8089	IV8089*DPI
1990-2000	Bush I-Clinton	IV9000	IV9000*DPI
2001-2006	Bush II	IV0106	IV0106*DPI

Binary variables introduced to models A.1.1 and A.2.1 for successive business cycle expansions. Each binary variable has a value of 1 for the years within the cycle, and 0 otherwise; 1946-1952 are represented by the original intercept and slope.

Table 5. Consumer Credit Log Linear Models With Binary Variables for the 1990s

dependent variable is log(CC/CPI)

Intercept	DPI/CPI	CORPAAA	U	MC/CPI+	IV9000	IV9000 * DPI	$\bar{R}$4F
-1.6618	0.9997	-0.115	-0.1253	0.5538	-2.2882	0.6144	.99
(-17.22)**	(25.03)**	(-5.35)**	(-4.63)**	(12.40)**	(-3.98)**	(3.83)**	2909.
-1.6281	0.9839	-0.114	-0.1319	0.5794	-0.0724		.99
(-10.22)**	(14.05)**	(-3.91)**	(-4.32)**	(6.98)**	(-3.10)*		2841.
-1.627	0.9826	-0.1136	-0.1312	0.5801		-0.0195	.99
(-9.97)**	(13.68)**	(-3.84)**	(-4.13)**	(6.78)**		(-2.96)*	2815.

All variables are expressed in natural logarithms. t-statistics in parentheses

* Statistically significantly different from 0 at the .01 level

** Statistically significantly different from 0 at the .001 level

+ Estimated values from first stage.

AR(1) and AR(2) transformations are applied to each model

For consumer credit, the coefficients of both the intercept (IV9000) and slope (IV9000&DPI) are significantly different from zero. The coefficient of IV9000 is -2.2882 and the coefficient of IV9000*DPI is 0.6144. The intercept for the model is -1.6618 throughout 1946-2006; for 1990-2000 it is -4.5438 (= -1.6618 - 2.2852). The elasticity for consumer credit with respect to disposable income is 0.9997 for 1946-2006 except for 1990-2000 when it is 1.6141 = 0.9997 + 0.6144. In the 1990s consumer credit increased considerably faster than disposable income, holding other factors constant. The income elasticity for 1946-1989 was close to 1.0, supporting the claim that consumer credit that excludes mortgage credit increased at the same rate as disposable income, except for the decade of the 1990s. Much of the consumer credit growth in the 1990s was due to increased use of credit cards, as documented by Johnson (2005).

Table 7. VAREC Model of Credit Growth

Variable	ΔlogRCC_t	ΔlogRMC_t
Constant	-0.8982 (-3.01)	-0.4617 (-3.02)
$\Delta\text{logRCC}_{t-1}$	0.1342 (0.85)	-0.1661 (-2.05)
$\Delta\text{logRCC}_{t-2}$	-0.0649 (-0.46)	0.0488 (0.67)
$\Delta\text{logRMC}_{t-1}$	-0.3073 (-0.90)	0.5627 (3.22)
$\Delta\text{logRMC}_{t-2}$	-0.4634 (-1.54)	-0.3950 (-2.56)
EC_{t-1}	-0.1156 (-3.87)	-0.0584 (-3.81)
ΔlogRDPI	0.3785 (3.88)	0.2063 (4.12)
CORPAAA	-0.0277 (-4.25)	-0.0192 (-5.76)
IV7479	-3.5449 (-2.96)	-1.4044 (-2.29)
IV7479*ΔlogRDPI	1.1296 (2.96)	0.4545 (2.32)
IV8089	0.0818 (2.38)	0.0690 (3.92)
R-square	0.62	0.79

Cointegrating relationship: $\text{EC}_t = \log(\text{RCC}_t) - 3.7073 + 1.0523 \log(\text{RMC}_t)$ t = 2.29.

IV7479 (=1 for 1974–1979, 0 otherwise) IV8089 (=1 for 1980-1989, 0 otherwise)

t-statistics appear in parentheses.

The logRCC and logRMC series are non-stationary but move together as shown by the earlier tests. ΔlogRCC does not have an autoregressive relationship at lags 1 and 2. ΔlogRMC has a positive autoregressive relationship at lag 1, a negative relationship at lag 2, and a significant negative cross correlation with ΔlogRCC at lag 1. Both variables have significant positive relationships with ΔlogRDPI and significant negative relationships with CORPAAA. Two binary variables (IV7479, IV8089, and the interaction IV7479*ΔlogRDPI are important for both ΔlogRCC and ΔlogRMC.

Figure 1. Growth Rates in Consumer and Mortgage Credit

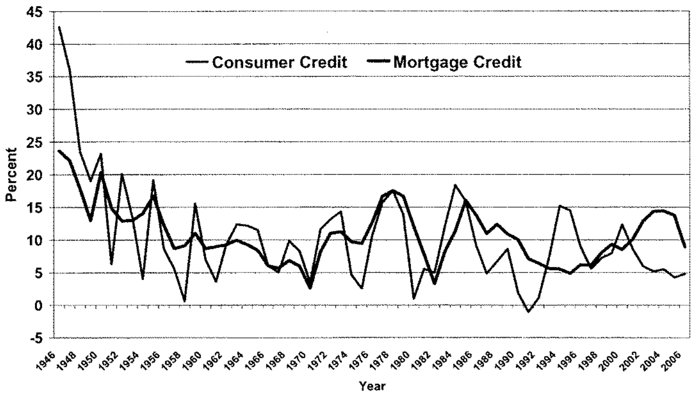

Figure 2. Enthoven's Limit

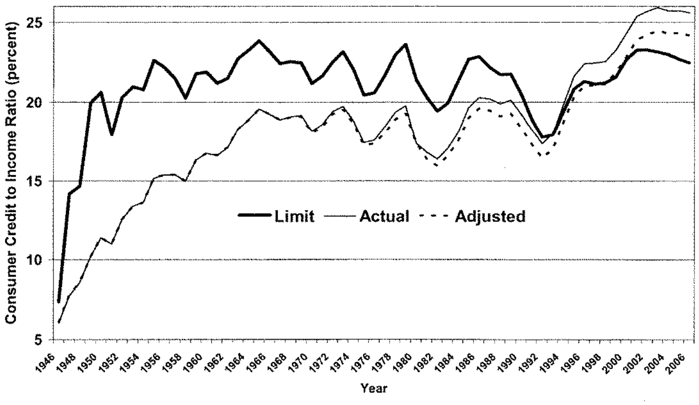

Table A.1. Linear Mortgage Credit OLS Models
Dependent variable is (MC/CPI)

Model	**Intercept**	**DPI/CPI**	**CORPAAA**	**TA/CPI**	**Other**
A.1.1	1010.007	0.1636	-0.1262	0.0122	
	(0.01)	(1.98)*	(-2.28)*	(2.07)**	
A.1.2	288,958.30	0.1465		0.0164	0.008 TBILL6
	(0.00)	(1.58)		(2.72)**	(0.22)
A.1.3	1069.355	0.1157	-0.1768		-0.0605 U
	(0.01)	(1.20)	(-3.14)**		(-1.48)
A.1.4	-1.3570	0.1566	-0.1395		0.0096 WEALTH/CPI
	(-0.21)	(1.84)	(-2.44)*		(1.56)
A.1.5	-0.3690	0.1496	-0.1659		-0.0004 FINAS/CPI
	(-0.06)	(1.69)	(-2.90)**		(-0.25)
A.1.6	-1.4276	0.0249	-0.1520		0.2431 LIQASST/CPI
	(0.31)	(0.29)	(-3.01)**		(3.86)*
A.1.7	-1.4240	0.1568	-0.1317	0.0114	0.0248 WAR
	(-0.22)	(1.80)	(-2.29)*	(1.85)	(0.20)
A.1.8	236,569.8	0.1594	-0.1252	0.0119	-0.0301 TAX86
	(0.00)	(1.89)	(-2.19)*	(2.04)*	(-0.11)
A.1.9	-0.9750	0.1530	-0.1321	0.0113	0.0012 MICH
	(-0.13)	(1.42)	(-2.14)*	(1.68)	(0.18)
A.1.10	-1.5582	0.1333	-0.1196	0.0116	-0.0583 RECYRS
	(-0.22)	(1.53)	(-2.05)*	(1.93)	(-0.91)

t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.2. Linear Consumer Credit Two-Stage Least Squares Models
dependent variable is (CC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	U	MC/CPI	Other
A.2.1	-0.3891	0.2108	-0.068	-0.0518	0.0668	
	(-1.22)	(9.09)***	(-2.80)**	(-3.04)**	(3.01)**	
A.2.2	-0.4532	0.1861		-0.0561	0.0862	-0.0119 TBILL6
	(-1.30)	(7.86)***		(-2.54)**	(3.69)***	(-0.61)
A.2.3	-0.3507	0.2136	-0.0697	-0.0511	0.0724	-0.0012 TA/CPI
	(-1.07)	(8.78)***	(-2.80)**	(-2.96)**	(2.69)**	(-0.40)
A.2.4	-0.3271	0.2141	-0.0702	-0.0505	0.0744	-0.0019 WEALTH/CPI
	(-0.99)	(8.99)***	(-2.85)**	(-2.94)**	(-2.88)**	(-0.63)
A.2.5	-0.3967	0.2117	-0.0677	-0.0522	0.0651	0.0002 FINAS/CPI
	(-1.24)	(8.96)***	(-2.76)**	(-3.03)**	(2.79)**	(0.30)
A.2.6	-0.4263	0.1839	-0.0698	-0.0537	0.0650	0.0292 LIQUASST/CPI
	(-1.22)	(5.10)***	(-2.86)**	(-3.17)**	(2.79)**	(1.02)
A.2.7	-0.4041	0.2122	-0.0677	-0.0522	0.0656	0.0218 WAR
	(-1.27)	(8.96)***	(-2.77)**	(-3.03)**	(2.89)**	(0.37)
A.2.8	-0.3758	0.2108	-0.0686	-0.0518	0.0663	0.0179 TAX86
	(-1.18)	(8.99)***	(-2.74)**	(-3.01)**	(2.91)**	(0.14)
A.2.9	0.0413	0.2045	-0.0734	-0.0690	0.0702	-0.0016 MICH
	(0.10)	(8.47)***	(-2.96)**	(-3.69)***	(3.05)**	(0.62)
A.2.10	-0.3757	0.2091	-0.0663	-0.0509	0.0683	-0.0066 RECYRS
	(-1.19)	(8.47)***	(-2.57)**	(-2.88)**	(2.91)**	(-0.20)

* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.3. Log-linear Mortgage Credit OLS Models
dependent variable is log(MC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	TA/CPI	Other
A.3.1	1.5550	0.5447	-0.1144	0.1384	
	(1.30)	(5.30)***	(-3.25)**	(2.05)*	
A.3.2	0.9877	0.4826		0.2342	0.0011 TBILL6
	(0.72)	(3.92)***		(3.37)***	(0.10)
A.3.3	3.2682	0.6914	-0.1498		-0.0188 U
	(0.75)	(4.73)***	(-4.50)***		(-1.17)
A.3.4	1.8219	0.5653	-0.1232		0.0928 WEALTH/CPI
	(1.46)	(5.49)***	(-3.48)***		(1.53)
A.3.5	2.3750	0.5970	-0.1459		-0.0011 FINAS/CPI
	(1.85)	(5.80)***	(-4.36)***		(-0.24)
A.3.6	1.5537	0.5654	-0.1088	0.1318	0.0102 WAR
	(1.20)	(5.47)***	(-3.09)**	(1.97)*	(1.23)
A.3.7	1.5048	0.5502	-0.1171	0.1386	0.0074 TAX86
	(1.28)	(5.26)***	(-3.24)**	(2.04)*	(0.39)
A.3.8	6.2981	0.5533	-0.1057	0.0847	0.0004 MICH
	(0.23)	(3.46)***	(-3.07)**	(1.25)	(1.00)
A.3.9	1.8788	0.5038	-0.1003	0.123	-0.0090 RECYRS
	(1.35)	(5.08)**	(-2.96)**	(1.91)	(-2.32)*

All variables are expressed in natural logarithms.
t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level
The R-square for each model is 0.99. AR(1) and AR(2) transformations are applied to each model.

Table A.4. Log-Linear Consumer Credit Two-Stage Least Squares Models

dependent variable is log(CC/CPI)

Model	Intercept	DPI/CPI	CORPAAA	U	MC/CPI	Other
A.4.1	-1.6510	0.9728	-0.1056	-0.1068	0.5576	
	(-7.12)***	(9.70)***	(-2.80)**	(-3.30)**	(4.33)***	
A.4.2	-2.4366	1.4961	-0.1694	-0.0905	-0.1129 lag	
	(-5.65)***	(9.84)***	(-2.98)**	(-3.18)**	(-1.33)	
A.4.3	-2.4220	1.2847		-0.0949	0.0231	-0.0110 TBILL6
	(-5.60)***	(5.91)***		(-2.30)*	(0.18)	(-0.47)
A.4.4	-2.6372	1.4829	-0.1708	-0.0887	-0.1248	0.0547 TA/CPI
	(-4.61)***	(6.23)***	(-2.64)**	(-3.07)**	(-0.94)	(0.39)
A.4.5	-2.5439	1.5293	-0.1775	-0.0879	-0.1156	0.0036 FINAS/CPI
	(-5.34)***	(6.84)***	(-2.89)**	(-3.05)**	(-0.92)	(0.34)
A.4.6	-2.5233	1.5166	-0.1781	-0.0879	-0.1091	0.0044 WEALTH/CPI
	(-4.59)***	(6.52)***	(-2.78)**	(-3.03)**	(-0.84)	(0.04)
A.4.7	-2.5273	1.5229	-0.1757	-0.0874	-0.1101	0.0043 WAR
	(-5.38)***	(6.89)***	(-2.80)**	(-3.04)**	(-0.89)	(0.25)
A.4.8	-2.1616	1.3315	-0.1412	-0.1316	-0.0074	-0.0001 MICH
	(-7.53)***	(7.56)***	(-2.95)**	(-5.61)***	(-0.07)	(-0.21)
A.4.9	-2.5260	1.5180	-0.1771	-0.0884	-0.1002	-0.0128 TAX86
	(-5.47)***	(6.94)***	(-2.88)**	(-3.07)**	(-0.81)	(-0.34)
A.4.10	-2.4884	1.4953	-0.1707	0.0860	-0.0945	-0.003 RECYRS
	(-5.24)***	(6.36)***	(-2.56)**	(-2.93)**	(-0.72)	(-0.30)

All variables are expressed in natural logarithms. Levels of consumer credit and mortgage credit may influence each other. New home owners may need additional consumer credit to purchase the essentials to settle into the abode. Increasing consumer credit will deter mortgage lenders from offering new mortgage credit. Thus, consumer credit models should be estimated as two stage least squares models.

t-statistics in parentheses
* Statistically significantly different from 0 at the .05 level
** Statistically significantly different from 0 at the .01 level
*** Statistically significantly different from 0 at the .001 level

The R-square for each model is 0.98. AR(1) and AR(2) transformations are applied to each model.